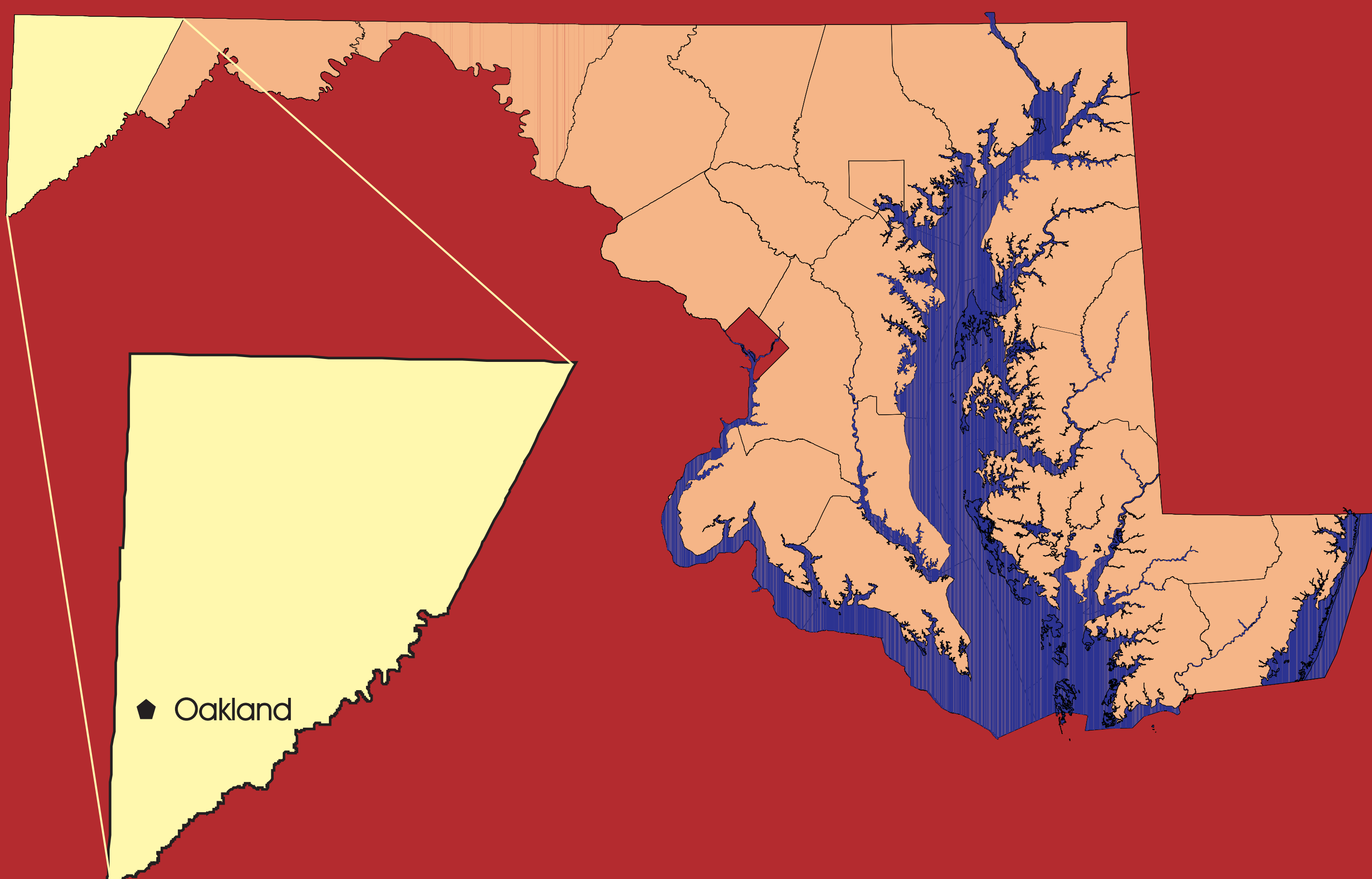
GARRETT COUNTY

RESULTS OF THE 1994-1997 MARYLAND BIOLOGICAL STREAM SURVEY: COUNTY ASSESSMENTS



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GARRETT COUNTY

Results of the 1994-1997 Maryland Biological Stream Survey: County-Level Assessments

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December 2001

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FOREWORD

This report is based on results of the Maryland Biological Stream Survey (MBSS), a program funded primarily by the Power Plant Research Program and administered by the Maryland Department of Natural Resources (MDNR). Field data for the MBSS were collected by the Maryland Department of Natural Resources. Analyses of water chemistry samples were conducted by the University of Maryland's Appalachian Laboratory. Much of the initial data analysis was conducted by Versar, Inc. for MDNR's Power Plant Assessment Division.

This report helps fulfill two outcomes in MDNR's Strategic Plan: 1) A Vital and Life Sustaining Chesapeake Bay and Its Tributaries, and 2) Sustainable Populations of Living Resources and Healthy Ecosystems.

ACKNOWLEDGMENTS

The 1994-1997 Maryland Biological Stream Survey has been a cooperative effort among several agencies, consultants and academic institutions. We wish to thank Nancy Roth and Ginny Mercurio from Versar in helping to compile some of the data used in this report. Versar also designed the sampling program, obtained landowners' permissions, and helped manage the data. We are also grateful to the many individuals from Maryland Department of Natural Resources, the University of Maryland's Appalachian Laboratory (AL), and the University of Maryland's Wye Research and Education Center (WREC) who comprised the field crews and did a great job collecting the data. MDNR staff also digitized watersheds and calculated land use data, provided quality assurance, and conducted field crew training. Nancy Roth and her colleagues at Versar developed the fish Index of Biotic Integrity, and Dr. Sam Stribling and his staff at Tetra Tech, Inc. developed the benthic Index of Biotic Integrity. Dr. Ray Morgan of AL and Mr. Lenwood Hall of the WREC supervised additional field crews and developed the Physical Habitat Index, and Dr. Keith Eshleman of AL assisted with analyses of data on acidified streams. Drs. Wayne Starnes and Bob Reynolds of the Smithsonian Institution (reptiles and amphibians), Dr. Rich Raesly of Frostburg State University (fish), Rita Villella of the U.S. Geological Survey Leetown Science Center (mussels), and Michael Naylor of MDNR (aquatic vegetation) provided taxonomic verifications of voucher specimens. The success of the project resulted from the strong efforts of all these groups. Special thanks go to Ron Klauda for his editorial support and Brenda Morgan for her assistance in formatting, editing, and organizing the report.

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INTRODUCTION

This report presents county-level data from the 1994-1997 Maryland Biological Stream Survey (MBSS or the Survey). Previous reports have documented interim results from the 1995 (Roth et al. 1997) and 1996 (Roth et al. 1998a) sample years. In addition, a comprehensive final report was produced to assess the "state of the streams" throughout the state (Roth et al. 1999). All previous MBSS reports have presented information by individual drainage basins. Because there is a recognized need for stream health information at the county level, a series of reports were prepared; this report is part of that series. This introductory section recounts the origin of the Survey and describes its components.

Origin of the MBSS

More than 10 years ago, the Maryland Department of Natural Resources (MDNR) recognized that atmospheric deposition was one of the most important environmental problems resulting from the generation of electric power. To determine the extent of acidification of Maryland streams resulting from acidic deposition, MDNR conducted the Maryland Synoptic Stream Chemistry Survey (MSSCS) in 1987. The MSSCS estimated the number and extent of streams at that time affected by or sensitive to acidification statewide and demonstrated the potential for adverse effects on biota from acidification. However, little direct information was available on the biological responses of Maryland streams to water chemistry conditions. Data that were available could not be used (because of methodological differences and spatial coverage limitations) to compare conditions across regions or watersheds (Tornatore et al. 1992). Neither was it possible to assess the interactions between acidic deposition and other anthropogenic and natural influences (CBRM 1989). For these reasons, in 1993, MDNR created the MBSS to provide comprehensive information on the status of biological resources in Maryland streams and how they are affected by acidic deposition and other cumulative effects of anthropogenic stresses.

Description of the MBSS

The MBSS is intended to help environmental decision-makers protect and restore the natural resources of Maryland. The primary objectives of the MBSS are:

- to assess the current status of biological resources in Maryland's non-tidal streams;
- to quantify the extent to which acidic deposition has affected or may be affecting biological resources in the state;
- to examine which other water chemistry, physical habitat, and land use factors are important in explaining the current status of biological resources in streams;
- to compile the first statewide inventory of stream biota;
- to establish a benchmark for long-term monitoring of trends in these biological resources; and
- to target future local-scale assessments and mitigation measures needed to restore degraded biological resources.

In creating the Survey, MDNR implemented a probability-based sampling design as a cost-effective way to characterize statewide stream resources. By randomly selecting sites, the Survey can make quantitative inferences about the characteristics of all 9,258 miles of first-to-third-order, non-tidal streams in Maryland (based on stream length on a 1:250,000-scale base map). MDNR recognized that the utility of these estimates depended on accurately measuring appropriate attributes of streams. The Survey focuses on biology for two reasons: (1) organisms themselves have direct societal value and (2) biological communities integrate stresses over time and are a valuable and cost-effective means of assessing ecological integrity (i.e., the capacity of a resource to sustain its inherent potential).

Fish are an important component of stream integrity and one that also contributes to substantial recreational values. For these reasons, fish communities are a primary focus of the Survey. The Survey collects quantitative data for the calculation of population estimates for individual fish species (both game and nongame). These data can also be used to evaluate fish community composition, individual fish health, and the geographic distribution of commercially important, rare, or non-indigenous fish species. Benthic (bottom-dwelling) macroinvertebrates are another essential component of streams and they constitute the second principal focus of the Survey. The Survey uses rapid bioassessment procedures for collecting benthic macroinvertebrates; these semi-quantitative methods permit comparisons of relative abundance and community composition, and have proven to be an effective way of assessing biological integrity in streams (Hilsenhoff 1987, Lenat 1988, Plafkin et al. 1989, Kerans and Karr 1994, Resh 1995). The Survey also records the presence of reptiles and amphibians (herpetofauna), freshwater mussels, and aquatic plants (both submerged aquatic vegetation (SAV) and emergent macrophytes). The Survey has established rigorous protocols (Kazyak 1996) for each of these sampling components, as well as training and auditing procedures to assure that data quality objectives are met.

Although the MBSS sampling design and protocols provide exceptional information for characterizing the stream resources in Maryland, designation of degraded areas and identification of likely stresses requires additional activities. Assessing the condition of biological resources (whether they are degraded or not degraded) requires the development of ecological indicators that permit the comparison of sampled segment results to minimally impacted reference conditions (i.e., the biological community expected in watersheds with little or no human-induced impacts). The Survey has used its growing database of information collected with consistent methods and broad coverage across the state to develop and test indicators of individual biological components (Stribling et al. 1998, Roth et al. 1998b) and physical habitat quality (Hall et al. 1999). Each of these indicators consists of multiple metrics using the general approach developed for the Index of Biotic Integrity (IBI) (Karr et al. 1986, Karr 1991) and the Chesapeake Bay Benthic Restoration Goals (Ranasinghe et al. 1994). The fish and benthic macroinvertebrate IBIs (which combine attributes of both the number and the type of species found) are widely accepted indicators that have been adapted for use in a variety of geographic locations (Miller et al. 1988, Cairns and Pratt 1993, Simon 1999). The Survey is investigating the possibility of developing additional indicators (e.g., amphibians in small streams with few or no fish) and combining components into a composite indicator of biological integrity.

In addition to developing reference-based indicators, the Survey is applying a variety of analytical methods to the question of which stressors are most closely associated with degraded streams. This involves correlational and multivariate analyses of water chemistry, physical habitat, land use, and biological information (e.g., presence of non-native species). The biological information also provides a valuable opportunity for documenting aquatic biodiversity across the state; the distribution and abundance of species previously designated as rare only by anecdotal evidence can be determined, and unique combinations of species at the ecosystem and landscape levels can be identified. Land use and other landscape-scale metrics will play an important role in identifying the relative contributions of different stressors to the cumulative impact on stream resources. Ultimately, the Survey seeks to provide an integrated assessment of the problems facing Maryland streams that will facilitate interdisciplinary solutions for their restoration. The survey also provides resource managers with the locations of relatively undisturbed streams and watersheds that deserve protection.

METHODS

This section presents the specific study design and procedures used to implement the Maryland Biological Stream Survey. The study area of concern and the sampling design developed to characterize it are presented, along with field and laboratory methods for each component: fish, benthic macroinvertebrates, reptiles and amphibians, physical habitat, and water chemistry. Methods for aquatic vegetation and mussel sampling are presented, but the resulting data are not included in this report. A full description of MBSS methods can be found in Kazyak (1996).

MBSS Study Design

The Survey study area comprises 17 distinct drainage basins across the state. Random sampling was used to allow the estimation of unbiased summary statistics (e.g., means, proportions, and their respective variances) for the entire state, a particular basin, and subpopulations of interest (e.g., streams with pH < 5).

Because it would have been cost prohibitive to visit a sufficient number of sites in all basins in a single year, lattice sampling was used to schedule sampling of all basins over a three-year period, 1995-1997. Lattice sampling, also known as multistratification, is a cost-effective means of allocating effort across time in a large geographic area (Heimbuch 1999, Jessen 1978, Cochran 1977). A table, or lattice, was formed by arranging 17 basins in 17 rows, and the years in 3 columns. Lattice sampling was the method used for selecting cells from this 17x3 table so that all basins would be sampled over a three-year period and all basins would have a non-zero probability of being sampled in a given year. The data presented in this report include those collected at random sampling sites within the 17 principal basins in Maryland, as well as sites from the 1994 demonstration project. Because no estimates were calculated for this report, these data were included to supplement the number of sites.

The sampling frame for the Survey was constructed by overlaying basin boundaries on a map of all blue-line stream reaches in the study area as digitized on a U.S. Geological Survey 1:250,000 scale topographic map. This sample frame was similar to that used by the earlier Maryland Synoptic Stream Chemistry Survey (MSSCS) conducted in 1987 (Knapp and Saunders 1987, Knapp et al. 1988). The Strahler convention (Strahler 1957) was used for ranking stream reaches by order; first-order reaches, for example, are the most upstream reaches in the branching stream system. Sampling was restricted to non-tidal, third-order and smaller stream reaches, excluding impoundments that were non-wadable or that substantially altered the riverine nature of the reach (Kazyak 1994). Together, these first-through third-order streams comprise about 90% of all stream and river miles in Maryland. Stream reaches were further divided into non-overlapping, 75-meter segments; these segments were the elementary sampling units from which biological, water chemistry, and physical habitat data were collected.

The 1995-1997 MBSS study design was based on stratified random sampling of segments within each basin; each basin was stratified by stream order. Within a stream order, the number of segments sampled per basin is proportional to the number of stream miles in the basin. To achieve the target number of samples per stream order within each basin, a given number of segments were randomly selected from each basin and ranked in order of selection. In all basins, extra segments were selected as a contingency against loss of sampling sites from restricted access to selected streams or from streams that were dry, too deep, or otherwise unsampleable owing to field conditions. In some basins, where only a small number of sites would have been selected using this method, additional random sites were selected to increase sample size. These extra sites (selected at random using the method described above) were used to provide better basinwide estimates; they were not included in the estimates of statewide conditions.

Permissions were obtained to access privately owned land adjacent to or near each stream segment. The procedures for obtaining permissions are described in Chaillou (1995). Because landowner permissions were obtained in a synoptic fashion and some variation in these rates occurred, we obtained more permissions than were needed for the Survey. Only the highest ranking sites were sampled until the target goal for that basin was reached. For the three year study, the success rate for obtaining permission to access stream sampling segments was high. Eighty-eight percent of sites that were targeted for permission were sampled.

Reasons for permission denial varied and generally reflected the preferences of landowners regarding property access, rather than any specific types of land. In rare cases, permission denial may affect the interpretation of Survey estimates, but only where denials occur in streams with characteristics that differ from the general population of streams. In one example of potential bias, several sites with known coal mining activities in the North Branch Potomac basin denied permission to sample, likely under representing the proportion of acid mine drainage streams in the population.

Field and Laboratory Methods

Benthic macroinvertebrate and water quality sampling were conducted in spring, when the benthos are thought to be reliable indicators of environmental stress (Plafkin et al. 1989) and when acid deposition effects are often the most pronounced. Fish, reptiles and amphibians, aquatic vegetation, and mussel sampling, along with physical habitat evaluations, were conducted during the low-flow period in summer. Fish community composition tends to be stable during summer, and low flow is advantageous for electrofishing. Because low-flow conditions in summer may be a primary factor limiting the abundance and distribution of fish populations, habitat assessments were performed during the summer. The sample size in summer is lower than in spring because some streams were dry in summer or were, in rare cases, otherwise unsampleable.

To reduce temporal variability, sampling during spring and summer was conducted within specific, relatively narrow time intervals, referred to as index periods (Janicki et al. 1993). These index periods were defined by degree-day limits for specific parts of the state. This approach provided a synoptic assessment of the current status of stream biota, water quality, and physical habitat in the 17 basins sampled. The spring index period was the time period between approximately March 1 and May 1, with end of the index period determined by degree-day accumulation as specified in Hilsenhoff (1987). In reality, most spring samples (78%) were collected in March, well before degree-day accumulation limits were approached. The summer index period was between June 1 and September 30 (Kazyak 1994).

Data Collection and Measurement

Field sampling followed procedures specified in the MBSS sampling manual (e.g., Kazyak 1996). A summary of the variables measured and the field and laboratory methods used to conduct the sampling follows.

Fish

Fish were sampled during the summer index period using double-pass electrofishing within 75-meter stream segments. Block nets were placed at each end of the segment and direct current backpack electrofishing units were used to sample the entire segment. An attempt was made to thoroughly fish each segment, and consistent effort was applied over the two passes. This sampling approach allowed calculation of several metrics useful in calculating a biological index and produced unbiased estimates of fish species abundance.

In small streams, a single electrofishing unit was used. In larger streams, two to five units were employed to effectively sample the site. Captured fish were identified to species, counted, weighed, and released. Any individuals that could not be identified to species were retained for laboratory confirmation. For each pass, all individuals of each gamefish species (defined as trout, bass, walleye, pike, chain pickerel, and striped bass) were measured for total length and examined for visible external pathologies or anomalies. For nongame species, up to 100 fish of each species (from both passes) were examined for visible external pathologies or anomalies. For each pass, all non-game species were weighed together for an aggregate biomass measurement; gamefish were also weighed in aggregate to the nearest 10 g.

Electrofishing was also conducted at supplemental, non-randomly selected sites during the summer index period. The presence of each species of fish was recorded for these segments to provide additional qualitative information on statewide fish distributions. Sampling effort at most qualitative sites was based on doubling the elapsed time since the last species was recorded or a minimum of 600 seconds of electrofishing effort.

After processing the fish collected in the field, voucher specimens were retained for each species not previously collected in the drainage basin. In addition, all individuals which could not be positively identified in the field were retained. The remaining fish were released. All voucher specimens and fish retained for positive identification in the laboratory were examined and verified by the MBSS Quality Assurance Officer or ichthyologists at Frostburg State University, Frostburg, Maryland or the Smithsonian Institution, Washington, DC.

Benthic Macroinvertebrates

Benthic macroinvertebrates were collected to provide a qualitative description of the community composition at each sampling site (Kazyak 1996). Sampling was conducted during the spring index period. Benthic community data were collected for the purpose of calculating biological metrics, such as those described in EPA's Rapid Bioassessment Protocols (Plafkin et al. 1989), and use as an indicator of biological integrity for Maryland streams.

At each segment, a 600 micron mesh "D" net was used to collect organisms from habitats likely to support the greatest taxonomic diversity. A riffle area was preferred, but other habitats were also sampled using a variety of techniques including kicking, jabbing, and gently rubbing hard surfaces by hand to dislodge organisms. If available, other habitat types were sampled, including rootwads, woody debris, leaf packs, macrophytes, and undercut banks. Each jab covered one square foot, and a total of approximately 2.0 m^2 (20 square feet) of combined substrates was sampled and preserved in 70% ethanol. In the laboratory, the preserved sample was transferred to a gridded pan and organisms were picked from randomly selected grid cells until the cell that contained the 100th individual (if possible) was completely picked. Some samples had fewer than 100 individuals. The benthic macroinvertebrates were identified to genus, or lowest practicable taxon, in the laboratory.

Index of Biotic Integrity

Sites were evaluated using both the fish (F-IBI) and benthic macroinvertebrate (B-IBI) IBIs developed for the MBSS (for detailed methods, see Roth et al. 1997 and Stribling et al. 1998). IBI scores for the MBSS are determined by comparing the fish or benthic macroinvertebrate assemblages at each site to those found at minimally impacted reference sites. Three separate formulations were employed for the fish IBI, one for each of three distinct geographic areas: Coastal Plain, Eastern Piedmont, and Highland. The two formulations used for the benthic IBI cover the Coastal Plain and non-Coastal Plain regions. Individual metrics for the IBI are scored 1, 3, or 5, based on comparison with the distribution of metric values at reference sites. For either the individual metrics or total IBI, a score of 3 or greater is considered comparable to reference site conditions, while scores falling below this threshold differ significantly from the reference conditions. Scores for the MBSS IBIs are calculated as the mean of the individual metric scores and therefore range from 1 to 5. Some other programs have used a similar approach (e.g., Weisberg et al. 1997), while others have instead computed the IBI as the total of individual metric scores. For example, Karr et al. (1986) calculated IBI as the sum of 12 metric scores, with totals ranging from 12 to 60 points.

Reptiles and Amphibians

At each sample segment, reptiles and amphibians were identified and the presence of observed species was recorded during the summer index period. A search of the riparian area was conducted within 5 meters of the stream on both sides of the 75-meter segment. Any reptiles and amphibians collected during the electrofishing of the stream segment were also included in the species list. Individuals were identified to species when possible. Voucher specimens and individuals not positively identifiable in the field were retained for examination in the laboratory and confirmation by herpetologists at the Smithsonian Institution, Washington, DC, or Towson University, Towson, Maryland.

Physical Habitat

Habitat assessments were conducted at all stream segments as a means of assessing the importance of physical habitat to the biological integrity and fishability of freshwater streams in Maryland. Procedures for habitat assessments (Kazyak 1996) were derived from two currently used methodologies: EPA's Rapid

Bioassessment Protocols (RBPs) (Plafkin et al. 1989), as modified by Barbour and Stribling (1991), and the Ohio EPA's Qualitative Habitat Evaluation Index (QHEI) (Ohio EPA 1987, Rankin 1989). A number of characteristics (instream habitat, epifaunal substrate, velocity/depth diversity, pool/glide/eddy quality, riffle/run quality, channel alteration, bank stability, embeddedness, channel flow status, and shading) were assessed qualitatively, based on visual observations within each 75-meter sample segment. Riparian zone vegetation width was estimated to the nearest meter, up to 50 meters from the stream. Additional observations of the surrounding area were used to assign ratings for aesthetic value (based on visible signs of human refuse at a site) and remoteness (based on distance from the nearest road, accessibility, and evidence of human activity). Also recorded were the presence or absence of various stream features including substrate types, various morphological characteristics, beaver ponds, point sources, and stream channelization. Local land uses visible from the stream segment and riparian vegetation type were also noted. Several additional physical characteristics were measured quantitatively to further characterize the habitat for each segment (see Kazyak 1996 for details). Quantitative measurements of the segment included maximum depth, stream gradient, velocity, thalweg depth, number of functional rootwads, number of functional large woody debris, wetted width, sinuosity, and overbank flood height. A velocity/depth profile was measured or other data were collected to enable calculation of discharge.

Physical Habitat Index

The Physical Habitat Index (PHI) was developed using MBSS data from 1994 to 1997 (Hall et al. 1999). As was the case in development of the fish and benthic IBIs, the conceptual approach was based on evaluating the relative importance (discriminatory power) of individual metrics and combinations of metrics explaining natural differences in streams throughout Maryland. These metrics were derived from both quantitative and qualitative habitat data collected during the summer index period. Based on analyses conducted for both fish IBI (Roth et al. 1998) and benthic macroinvertebrate IBI (Stribling et al. 1998) development in Maryland, the State was divided into two regions: the Coastal Plain and non-Coastal Plain. The resulting index was then adjusted to a centile scale that rated each sample segment as follows: Good - 72 to 100; Fair - 42 to 71.9; Poor - 12 to 41.9; and Very Poor - 0 to 11.9.

Water Chemistry

During the spring index period, water samples were collected at each site for analysis of pH, acid neutralizing capacity (ANC), conductivity, sulfate, nitrate-nitrogen, and dissolved organic carbon (DOC). These variables describe basic water quality conditions with an emphasis on factors related to acidic deposition.

Grab samples were collected in one-liter bottles for analysis of all analytes except pH. Water samples for pH were collected with 60 ml syringes, which allowed purging of air bubbles to minimize changes in carbon dioxide content (EPA 1987). Samples were stored on wet ice and shipped on wet ice to the analytical laboratory within 48 hours. Laboratory analyses were carried out by the University of Maryland's Appalachian Laboratory in Frostburg.

Chemical analysis of water samples followed standard methods described in EPA's Handbook of Methods for Acid Deposition Studies (EPA 1987). EPA protocols were followed, except that ANC sample volume was reduced to 40 ml to ease handling. Routine daily quality control (QC) checks included processing duplicate, blank, and calibration samples according to EPA guidelines for each analyte. Field duplicates were taken at 5% of all sites. Routine QC checks helped to identify and correct errors in sampling routines or instrumentation at the earliest possible stage.

During the summer index period, in situ measurements of dissolved oxygen (DO), pH, temperature, and conductivity were collected at each site to further characterize existing water quality conditions that might influence biological communities. Measurements were made at an undisturbed section of the segment, usually in the middle of the stream channel, using electrode probes. Instruments were calibrated daily and calibration logbooks were maintained to document instrument performance.

Recognizing that water temperature is an important factor affecting stream condition, but one that varies daily and seasonally, temperature loggers were deployed at 220 sites in five basins during 1997. The basins sampled were: the Choptank, Susquehanna, Potomac Washington Metro, Patuxent, and Pocomoke. Onset Computer Corporation Optic Stowaway temperature loggers were anchored in each site during the summer index period. Water temperature was recorded every 15 minutes from June 15 until mid-September.

Mussels

During the summer index period, freshwater mussels were sampled qualitatively by examining each 75-meter stream segment for their presence. Mussels were identified to species, their presence recorded, and subsequently released. Species not positively identifiable in the field were retained for confirmation by U.S. Geological Survey (USGS) Biological Resources Division staff.

Aquatic Vegetation

Aquatic vegetation was sampled qualitatively by examining each 75-meter segment for the presence of aquatic plants. Plants were identified to species and their presence recorded for each site. While the primary objective was to document the presence of submerged aquatic vegetation (SAV), emergent and floating aquatic vegetation was also recorded when encountered. Species not positively identifiable in the field were retained for laboratory examination and confirmation by MDNR's staff expert on SAV. Due to the difficulty in long-term preservation, no permanent vouchers of aquatic vegetation were retained.

Data Management

All crews used standardized pre-printed data forms developed for the Survey to ensure that all data for each sampling segment were recorded and standard units of measure were used (Kazyak 1996). Using standard data forms facilitated data entry and minimized transcription error. The field crew leader and a second reviewer checked all data sheets for completeness and legibility before leaving each sampling location. Original data sheets were sent to the Data Management Officer for further review and data entry, while copies were retained by the field crews.

A custom database application, in which the input module was designed to match each of the field data sheets, was used for data entry. Data were independently entered into two databases and compared using a computer program as a quality-control procedure. Differences between the two databases were resolved from original data sheets or through discussions with field crew leaders.

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Maryland Biological Stream Survey Data

COUNTY SUMMARY

A total of 153 sites were sampled in Garrett County by MBSS sampling crews during 1994-1997 (Table 1; Figure 2). Qualitative fish sampling was conducted at an additional 100 sites to provide a more complete picture of fish species distributions. Appendix A provides a summary of the types of data available for each of the sites sampled.

Species Highlights

A total of 41 fish species were collected in the small to mid-sized streams that were sampled (Table 2); this number ties the county for a ranking of twelfth. Unlike most other areas of the state, a relatively high percentage (19%) of the sites sampled contained no fish. The likely reason for this is the higher elevation and gradient of many headwater streams in the county that can impair fish movement.

Blacknose dace and creek chub, two pollution-tolerant species, were the most commonly found fish species during the 1994-1997 MBSS. Brook trout, a pollution-sensitive species, was also present at a moderate percentage (36%) of the sites sampled. The lack of extensive urbanization (and subsequently, a low level of impervious surfaces) explains the continuing presence of brook trout in Garrett County, in comparison to other counties in the state. Two rare fishes in Maryland, striped shiner and johnny darter, were found at 5% and 13% of the sites sampled, respectively.

In contrast to fish species diversity, the 242 genera of benthic macroinvertebrates found in Garrett County rank this area as the best in Maryland for benthic diversity (Table 3). In addition, 70 genera (29%) were found at a single site, and some appear to be rare on a statewide basis.

Twenty-three species of reptiles and amphibians were found in or near Garrett County streams (Table 4), tying the county for a ranking of fourth in the state. No state or federally listed reptiles or amphibians were collected during the sampling. However, the Jefferson salamander, rare in the state of Maryland, was found at a single site.

Ecological Health

The overall ecological health of Garrett County's headwater streams can best be described as Fair. The average F-IBI score and the average B-IBI score among sites were 3.10 (Fair category). Based on F-IBI and B-IBI scores from individual sites, some of the best streams are: the mainstem Savage River, Little Laurel Run, Bear Creek, Piney Creek, Little Bear Creek, Mill Run, South Branch Casselman River, and Poplar Lick Run (Table 6). Some of the lowest rated steams include: North Glade Run, Bull Glade Run, Three Forks Run, Cherry Creek, and Staub Run.

Physical Habitat

Physical habitat in Garrett County was rated as Fair by the Physical Habitat Index. Values ranged from 2.58 to 96.81, with an average score of 44.01 (low end of the Fair range, ranking nineteenth among counties in the state) (Table 6; Figure 5). Other noteworthy points include a ranking of second best for bank stability and second worst for instream rootwad abundance (trees whose roots protect banks from erosion and provide habitat for aquatic life). Garrett County streams were also ranked tenth in epifaunal substrate and seventh in instream habitat..

Nitrate-Nitrogen

Nitrate-nitrogen values at sites sampled averaged 0.6 mg/L; only three counties had lower mean values. The high percentage of forested land is probably responsible for these low values (Table 7). In no stream was the EPA limit for drinking water (10 mg/L) exceeded

Table 1. Site information and land use data collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Basin abbreviations are as follows: NO - North Branch Potomac River; YG - Youghiogheny River.

Site	Latitude	Longitude	Stream Name	Basin	Order	Catchment Acres	% Urban	% Agric.	% Forest
AL-A-229-109-96	39.6329	78.9770	Staub Run	NO	1	576.37	0.00	1.30	98.70
AL-A-567-126-96	39.6708	78.9549	Un Trib To Sand Spring Run	NO	1	161.96	1.26	10.71	86.55
GA-A-001-105-95	39.4115	79.2998	Block Run	YG	1	139.31	0.00	12.47	87.04
GA-A-002-312-96	39.6135	79.0472	Savage R	NO	3	10758.44	0.46	31.13	66.77
GA-A-008-213-96	39.6342	79.0587	Blue Lick	NO	2	2215.65	0.12	18.00	81.88
GA-A-010-205-95	39.4626	79.3302	Ut Deep Creek Lake	YG	2	507.68	0.00	53.49	43.82
GA-A-011-1-94	39.5446	79.3035	Cherry Cr	YG	3	6637.20	0.04	19.92	63.02
GA-A-011-2-94	39.5385	79.3162	Cherry Cr	YG	3	7869.80	0.03	18.48	66.73
GA-A-011-301-97	39.5470	79.3100	Cherry Cr	YG	3	7246.34	0.04	19.71	64.23
GA-A-011-317-97	39.5450	79.3040	Cherry Cr	YG	3	7128.99	0.04	20.00	63.70
GA-A-011-3-94	39.5422	79.3143	Cherry Cr	YG	3	7329.60	0.04	19.47	64.68
GA-A-017-223-96	39.3623	79.2906	Laurel Run	NO	2	1823.69	0.00	16.05	78.55
GA-A-021-1-94	39.5409	79.2990	Cherry Cr	YG	1	324.30	0.00	0.00	95.37
GA-A-021-2-94	39.5421	79.2986	Cherry Cr	YG	1	335.20	0.00	0.00	94.00
GA-A-022-215-96	39.6616	79.0286	Mudlick Run	NO	2	1507.95	0.05	51.74	47.40
GA-A-027-1-94	39.5524	79.2878	Cherry Cr	YG	2	3724.80	0.03	29.80	51.51
GA-A-027-2-94	39.5519	79.2883	Cherry Cr	YG	2	3896.40	0.04	29.35	52.12
GA-A-027-3-94	39.5479	79.2930	Cherry Cr	YG	2	3991.40	0.05	29.53	51.68
GA-A-027-4-94	39.5485	79.2925	Cherry Cr	YG	2	3939.20	0.05	29.55	51.85
GA-A-028-117-97	39.3930	79.4200	Un Trib To Little Youghiogheny R	YG	1	260.00	0.26	63.07	36.66
GA-A-030-213-97	39.7040	79.0130	Piney Cr	YG	2	7633.63	0.47	33.29	65.99
GA-A-039-307-97	39.6510	79.3850	South Br Bear Cr	YG	3	10762.60	0.62	34.69	64.37
GA-A-050-201-97	39.3840	79.3940	Trout Run	YG	2	4247.02	0.31	63.36	35.25
GA-A-053-206-96	39.6032	79.1218	Poplar Lick Run	NO	2	4183.27	0.04	4.22	93.84
GA-A-059-216-97	39.6060	79.2040	South Br Casselman R	YG	2	2654.70	0.01	28.78	69.64
GA-A-059-225-97	39.6100	79.1960	South Br Casselman R	YG	2	3046.71	0.01	25.43	73.14
GA-A-062-202-95	39.7193	79.3302	Mill Run	YG	2	4517.04	0.58	12.95	85.56
GA-A-062-203-97	39.7190	79.3370	Mill Run	YG	2	4695.45	0.61	12.96	85.56
GA-A-062-222-95	39.7150	79.3160	Mill Run	YG	2	4131.32	0.64	14.19	84.17
GA-A-076-209-96	39.6178	79.0688	Blue Lick Run	NO	2	3910.06	0.07	13.70	86.20
GA-A-089-1-94	39.5118	79.2439	North Glade Run	YG	1	781.90	0.18	64.54	31.49
GA-A-089-2-94	39.5095	79.2508	North Glade Run	YG	1	1046.00	0.13	64.35	32.49
GA-A-090-310-96	39.5777	79.1674	Big Run	NO	3	2765.14	0.02	1.77	97.44
GA-A-094-303-97	39.6560	79.3670	Bear Cr	YG	3	19611.15	0.31	25.89	72.81
GA-A-098-225-95	39.5988	79.3397	Ut Bear Creek	YG	2	907.13	1.16	31.96	66.54
GA-A-105-317-96	39.6401	79.0238	Savage R	NO	3	8628.19	0.53	31.14	66.39
GA-A-105-318-96	39.6365	79.0295	Savage R	NO	3	8888.13	0.52	30.74	66.85
GA-A-107-209-97	39.6590	79.2760	Little Bear Cr	YG	2	3330.03	0.07	11.32	88.25
GA-A-111-314-97	39.4000	79.3550	Little Youghiogheny R	YG	3	7932.70	0.71	23.56	73.19
GA-A-111-316-95	39.3963	79.3672	Little Youghiogheny River	YG	3	8311.43	0.95	23.60	72.68
GA-A-112-101-97	39.5760	79.3760	Ginseng Run	YG	1	119.38	0.57	35.52	63.07
GA-A-120-103-95	39.6996	78.9931	Ut Piney Creek	YG	1	1012.26	0.74	31.46	67.35
GA-A-121-210-96	39.5692	79.1205	Bear Pen Run	NO	2	1873.03	0.00	4.71	80.34
GA-A-128-217-95	39.3320	79.4181	Ut Cherry Creek	YG	2	1973.53	0.10	24.06	75.79
GA-A-130-110-97	39.6990	79.3130	Cove Run	YG	1	178.67	0.38	46.45	50.10
GA-A-133-112-96	39.4949	79.1817	Spring Lick	NO	1	991.46	0.03	18.23	81.70
GA-A-141-213-95	39.6216	79.2815	Bear Creek	YG	2	4357.98	0.21	37.96	59.04

Table 1 (cont.). Site information and land use data collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Basin abbreviations are as follows: NO - North Branch Potomac River; YG - Youghiogheny River.

Site	Latitude	Longitude	Stream Name	Basin	Order	Catchment Acres	% Urban	% Agric.	% Forest
GA-A-142-118-95	39.4608	79.3400	Ut Deep Creek Lake	YG	1	158.05	0.00	52.79	41.63
GA-A-143-105-97	39.5870	79.2830	Cherry Cr	YG	1	1440.33	0.00	19.34	66.19
GA-A-143-1-94	39.5848	79.2848	Cherry Cr	YG	1	1551.90	0.00	20.71	64.45
GA-A-143-5-94	39.5628	79.2990	Cherry Cr	YG	1	2575.50	0.01	29.78	53.61
GA-A-152-1-94	39.5702	79.3487	Marsh Run Cove	YG	2	244.10	1.15	9.09	89.76
GA-A-152-5-94	39.5613	79.3520	Marsh Run Cove	YG	2	493.00	1.12	12.62	85.84
GA-A-159-202-96	39.5147	79.1601	Middle Fork	NO	2	6738.14	0.03	8.82	90.42
GA-A-179-113-95	39.7167	79.3575	Ut Mill Run	YG	1	146.86	0.00	50.70	48.60
GA-A-181-1-94	39.3968	79.4787	Snowy Cr	YG	3	13391.10	1.16	29.64	65.66
GA-A-181-2-94	39.3901	79.4680	Snowy Cr	YG	3	13789.50	1.15	29.51	65.83
GA-A-181-303-95	39.3915	79.4680	Snowy Creek	YG	3	14674.71	1.14	29.52	65.82
GA-A-184-328-96	39.5792	79.0945	Savage R	NO	3	29708.87	0.19	16.36	82.13
GA-A-185-309-95	39.3603	79.4460	Cherry Creek	YG	3	10065.64	0.07	51.92	46.18
GA-A-185-321-95	39.3632	79.4482	Cherry Creek	YG	3	10157.81	0.07	51.64	46.48
GA-A-191-322-96	39.3413	79.2619	Laurel Run	NO	3	5494.22	0.01	15.71	81.41
GA-A-195-203-95	39.3860	79.3751	Ut Little Youghioghent R	YG	2	1089.77	0.31	67.59	31.56
GA-A-200-224-97	39.6310	79.1910	South Br Casselman R	YG	2	6310.95	0.02	21.33	77.59
GA-A-205-222-96	39.4125	79.1679	Three Forks Run	NO	2	5925.31	0.03	4.77	92.96
GA-A-215-1-94	39.3853	79.4761	Laurel Run	YG	2	7598.50	0.06	4.98	89.25
GA-A-215-2-94	39.3857	79.4718	Laurel Run	YG	2	7686.30	0.06	5.23	89.01
GA-A-235-215-95	39.5065	79.2546	North Glade Run	YG	2	2306.36	0.10	59.40	36.77
GA-A-235-4-94	39.5065	79.2529	North Glade Run	YG	2	2272.20	0.11	59.73	36.48
GA-A-235-5-94	39.5065	79.2564	North Glade Run	YG	2	2316.20	0.10	58.71	37.48
GA-A-236-216-95	39.7021	79.1701	Big Shade Run	YG	2	2651.78	0.05	25.91	72.47
GA-A-236-218-95	39.7093	79.1692	Big Shade Run	YG	2	2521.25	0.05	27.02	71.57
GA-A-247-111-97	39.6720	79.3350	Fikes Run	YG	1	766.12	0.00	9.60	90.27
GA-A-251-217-97	39.7040	79.4490	Cherry Cr	YG	2	1958.73	0.10	35.61	61.82
GA-A-268-222-97	39.6490	79.3410	Un Trib To Bear Cr	YG	2	1001.28	0.92	47.44	51.47
GA-A-276-106-96	39.5395	79.2086	Double Lick Run	NO	1	532.82	0.00	6.96	91.95
GA-A-279-104-97	39.4290	79.3210	Un Trib To Little Youghiogheny R	YG	1	549.61	0.62	31.10	67.41
GA-A-304-316-97	39.6160	79.3510	South Br Bear Cr	YG	3	4306.39	1.31	43.13	55.02
GA-A-306-210-97	39.7140	79.1400	Crab Run	YG	2	942.91	0.18	74.21	25.29
GA-A-309-215-97	39.5730	79.3930	Ginseng Run	YG	2	1179.23	0.49	29.17	69.47
GA-A-309-221-97	39.5670	79.4230	Ginseng Run	YG	2	2298.02	0.37	28.01	70.52
GA-A-310-318-97	39.6690	79.2060	North Br Casselman R	YG	3	14339.73	0.03	18.59	76.51
GA-A-314-116-96	39.3234	79.3232	Un Trib To Glade Run	NO	1	296.35	0.00	28.59	70.61
GA-A-315-101-96	39.6254	79.1007	Blacklick Run	NO	1	448.78	0.23	39.15	60.62
GA-A-326-106-95	39.4538	79.4070	Millers Run	YG	1	1665.69	0.02	9.07	81.75
GA-A-343-319-97	39.6870	79.4090	Buffalo Run	YG	3	12620.30	0.25	28.87	70.05
GA-A-347-1-94	39.5250	79.3815	Deep Creek Lake	YG	1	86.40	0.00	0.00	100.00
GA-A-347-3-94	39.5257	79.3815	Deep Creek Lake	YG	1	79.30	0.00	0.00	100.00
GA-A-347-4-94	39.5217	79.3818	Deep Creek Lake	YG	1	130.30	0.00	0.00	100.00
GA-A-351-117-95	39.7153	78.9503	Piney Creek	YG	1	646.04	2.01	25.41	72.27
GA-A-352-212-97	39.4330	79.3550	Broad Ford Run	YG	2	2178.66	0.12	54.89	42.14
GA-A-358-115-95	39.7071	78.9837	Ut Piney Creek	YG	1	1031.98	1.02	37.78	60.96
GA-A-368-116-97	39.5510	79.3890	Hoyes Run	YG	1	867.92	0.32	25.18	72.81
GA-A-372-129-96	39.5263	79.1849	Un Trib To Middlefork Run	NO	1	193.26	0.00	2.82	97.18

Table 1 (cont.). Site information and land use data collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Basin abbreviations are as follows: NO - North Branch Potomac River; YG - Youghiogheny River.

Site	Latitude	Longitude	Stream Name	Basin	Order	Catchment Acres	% Urban	% Agric.	% Forest
GA-A-373-220-95	39.5915	79.3536	Rocklick Creek	YG	2	748.98	0.86	44.55	54.40
GA-A-395-219-97	39.7140	79.3470	Mill Run	YG	2	6556.97	0.56	17.80	80.97
GA-A-405-112-95	39.4417	79.3625	Ut Ford Run	YG	1	456.78	0.30	46.46	51.53
GA-A-407-310-97	39.6470	79.2260	North Br Casselman R	YG	3	11625.35	0.03	20.22	74.28
GA-A-407-312-97	39.6320	79.2260	North Br Casselman R	YG	3	10593.75	0.03	19.72	74.34
GA-A-407-313-97	39.6340	79.2260	North Br Casselman R	YG	3	5088.57	0.02	21.50	75.71
GA-A-407-314-95	39.6515	79.2182	North Branch Casselman R	YG	3	12056.09	0.03	19.63	75.07
GA-A-409-102-97	39.6860	79.3790	Un Trib To Youghiogheny R	YG	1	868.32	0.43	6.11	92.91
GA-A-416-118-96	39.5497	79.2015	Blackhawk Run	NO	1	259.26	0.00	3.42	91.98
GA-A-420-323-95	39.4641	79.4319	Herrington Run	YG	3	7953.19	0.02	7.86	88.95
GA-A-420-325-95	39.4638	79.4286	Herrington Run	YG	3	7989.03	0.02	7.82	88.99
GA-A-432-315-95	39.6503	79.2906	Bear Creek	YG	3	9914.68	0.13	22.87	75.42
GA-A-432-320-95	39.6507	79.2966	Bear Creek	YG	3	10216.71	0.14	23.25	75.08
GA-A-439-205-97	39.5930	79.2110	South Br Casselman R	YG	2	1435.14	0.00	31.98	66.94
GA-A-443-112-97	39.4940	79.4670	Bull Glade Run	YG	1	422.89	0.00	0.00	100.00
GA-A-450-113-97	39.7100	79.1150	Un Trib To Casselman R	YG	1	610.25	0.73	10.40	88.26
GA-A-453-310-95	39.6617	79.1797	North Branch Casselman R	YG	3	12863.99	0.16	20.86	77.69
GA-A-457-114-95	39.6696	79.2780	Ut Little Bear Creek	YG	1	393.73	0.35	11.86	87.01
GA-A-470-306-96	39.3637	79.2416	Lostland Run	NO	3	6496.91	0.06	11.33	86.66
GA-A-470-309-96	39.3619	79.2354	Lostland Run	NO	3	6561.90	0.06	11.27	86.73
GA-A-470-315-96	39.3619	79.2328	Lostland Run	NO	3	6570.75	0.06	11.26	86.74
GA-A-490-116-95	39.3967	79.4306	White Meadow Run	YG	1	248.56	1.23	48.91	43.58
GA-A-490-119-95	39.3769	79.4510	White Meadow Run	YG	1	1213.80	0.34	37.89	58.43
GA-A-493-109-95	39.6443	79.1786	Little Laurel Run	YG	1	1537.82	0.04	19.99	79.37
GA-A-496-105-96	39.3263	79.3523	Glade Run	NO	1	308.60	0.00	72.02	25.64
GA-A-505-210-95	39.5929	79.2539	North Branch Casselman R	YG	2	5301.74	0.05	18.01	72.68
GA-A-505-218-97	39.6080	79.2490	North Br Casselman R	YG	2	6011.03	0.04	18.58	73.13
GA-A-506-106-97	39.6560	79.4660	Un Trib To Buffalo Run	YG	1	234.87	0.00	30.19	66.62
GA-A-511-322-95	39.6072	79.2400	North Branch Casselman R	YG	3	8420.67	0.03	17.26	75.56
GA-A-512-214-96	39.5760	79.1211	Bear Pen Run	NO	2	1244.94	0.00	6.07	73.21
GA-A-518-220-97	39.5880	79.4140	Un Trib To Youghiogheny R	YG	2	1530.03	0.33	40.27	58.84
GA-A-520-1-94	39.5754	79.3471	Marsh Run Cove	YG	1	78.20	1.28	5.12	93.61
GA-A-520-2-94	39.5760	79.3471	Marsh Run Cove	YG	1	73.30	1.36	5.46	93.18
GA-A-521-108-95	39.7038	79.2885	Mill Run	YG	1	1860.78	1.10	11.67	85.51
GA-A-523-203-96	39.4754	79.1221	Un Trib To Laurel Run	NO	2	1542.66	0.00	12.49	86.92
GA-A-542-304-97	39.5100	79.4310	Muddy Cr	YG	3	12141.54	0.07	20.51	69.80
GA-A-542-308-97	39.5200	79.4330	Muddy Cr	YG	3	11876.98	0.07	20.99	69.08
GA-A-542-309-97	39.5120	79.4310	Muddy Cr	YG	3	12091.88	0.07	20.60	69.66
GA-A-545-301-95	39.6727	79.1964	North Branch Casselman R	YG	3	17419.23	0.04	17.66	76.34
GA-A-545-302-97	39.6730	79.2060	North Br Casselman R	YG	3	15195.97	0.03	17.74	77.32
GA-A-547-108-97	39.5620	79.4580	Salt Block Run	YG	1	2612.78	0.04	29.14	66.31
GA-A-547-2-94	39.5669	79.4721	Salt Block Run	YG	1	1871.20	0.03	34.68	61.57
GA-A-547-5-94	39.5810	79.4346	Salt Block Run	YG	1	3538.60	0.09	21.74	73.28
GA-A-547-8-94	39.5679	79.4753	Salt Block Run	YG	1	1771.80	0.03	34.62	61.76
GA-A-548-1-94	39.5435	79.2962	Cherry Cr	YG	3	5885.60	0.05	22.24	60.44
GA-A-548-2-94	39.5432	79.2970	Cherry Cr	YG	3	5894.40	0.05	22.22	60.37
GA-A-548-317-95	39.5459	79.2935	Cherry Creek	YG	3	2336.50	0.00	7.11	84.48
GA-A-548-3-94	39.5452	79.2938	Cherry Cr	YG	3	5815.10	0.05	22.39	60.65

Table 1 (cont.). Site information and land use data collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Basin abbreviations are as follows: NO - North Branch Potomac River; YG - Youghiogheny River.

Site	Latitude	Longitude	Stream Name	Basin	Order	Catchment Acres	% Urban	% Agric.	% Forest
GA-A-551-227-95	39.6208	79.3221	Ut Bear Creek	YG	2	1282.05	3.12	52.73	43.16
GA-A-553-1-94	39.5462	79.2897	Cherry Cr	YG	2	1738.90	0.06	5.64	83.35
GA-A-553-2-94	39.5457	79.2881	Cherry Cr	YG	2	1719.30	0.06	5.48	83.56
GA-A-557-1-94	39.4981	79.2317	North Glade Run	YG	1	521.60	0.00	50.36	44.15
GA-A-557-2-94	39.4986	79.2359	North Glade Run	YG	1	701.80	0.00	58.12	36.99
GA-A-558-211-96	39.6597	79.0014	Savage R	NO	2	3761.71	1.01	29.79	65.61
GA-A-560-201-95	39.6693	79.4502	Buffalo Run	YG	2	5067.49	0.51	32.55	66.00
GA-A-563-318-95	39.4638	79.4457	Herrington Run	YG	3	7055.65	0.02	8.55	88.16
GA-A-999-1-94	39.4124	79.4815	Snowy Cr	YG	3	12174.80	1.23	31.12	64.02
GA-A-999-2-94	39.4097	79.4819	Snowy Cr	YG	3	12285.80	1.24	31.39	63.77
GA-A-999-302-96	39.5540	79.1212	Savage R	NO	3	33536.93	0.17	14.91	82.84

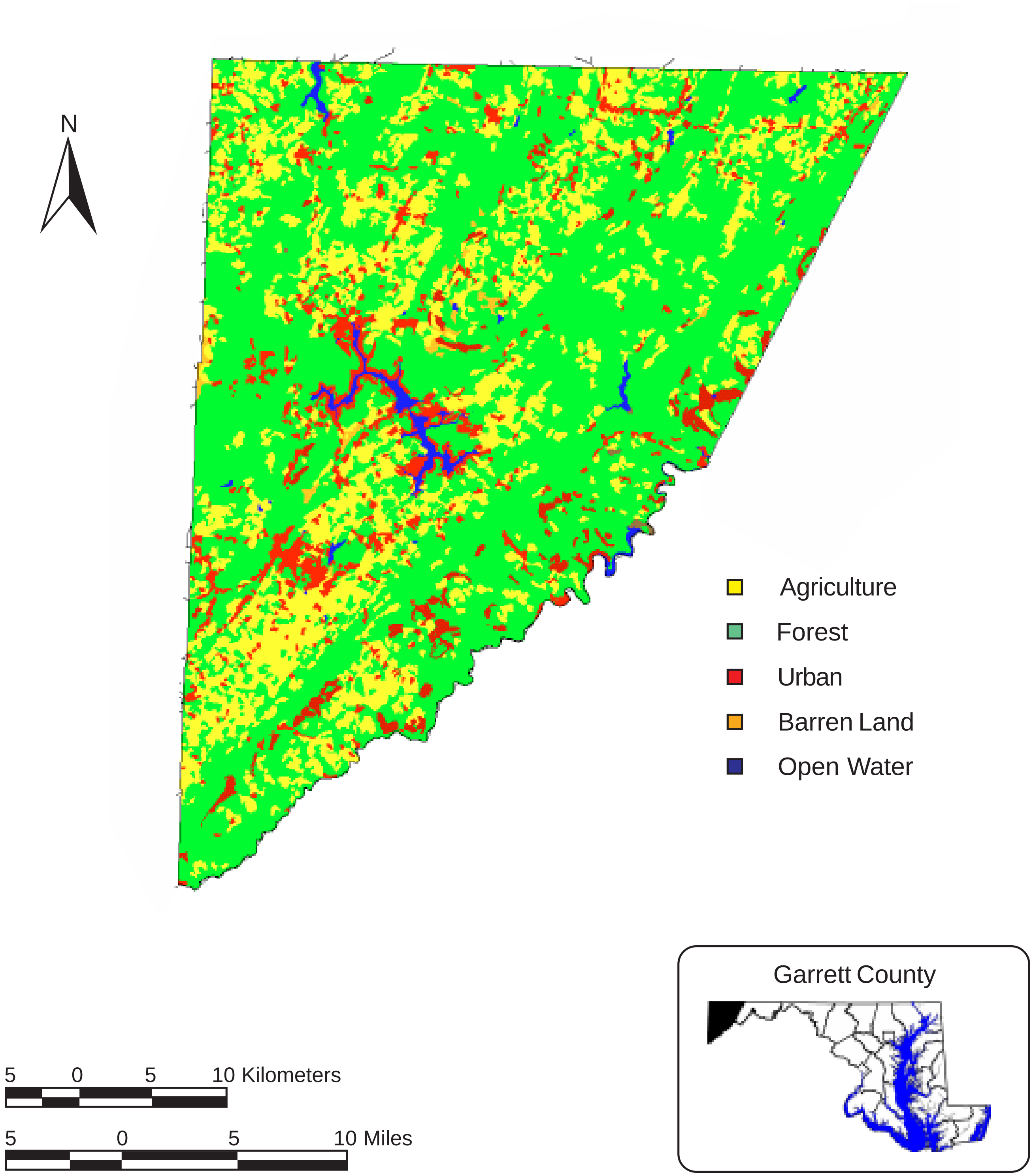

Figure 1. Land use in Garrett County (MOP 1994).

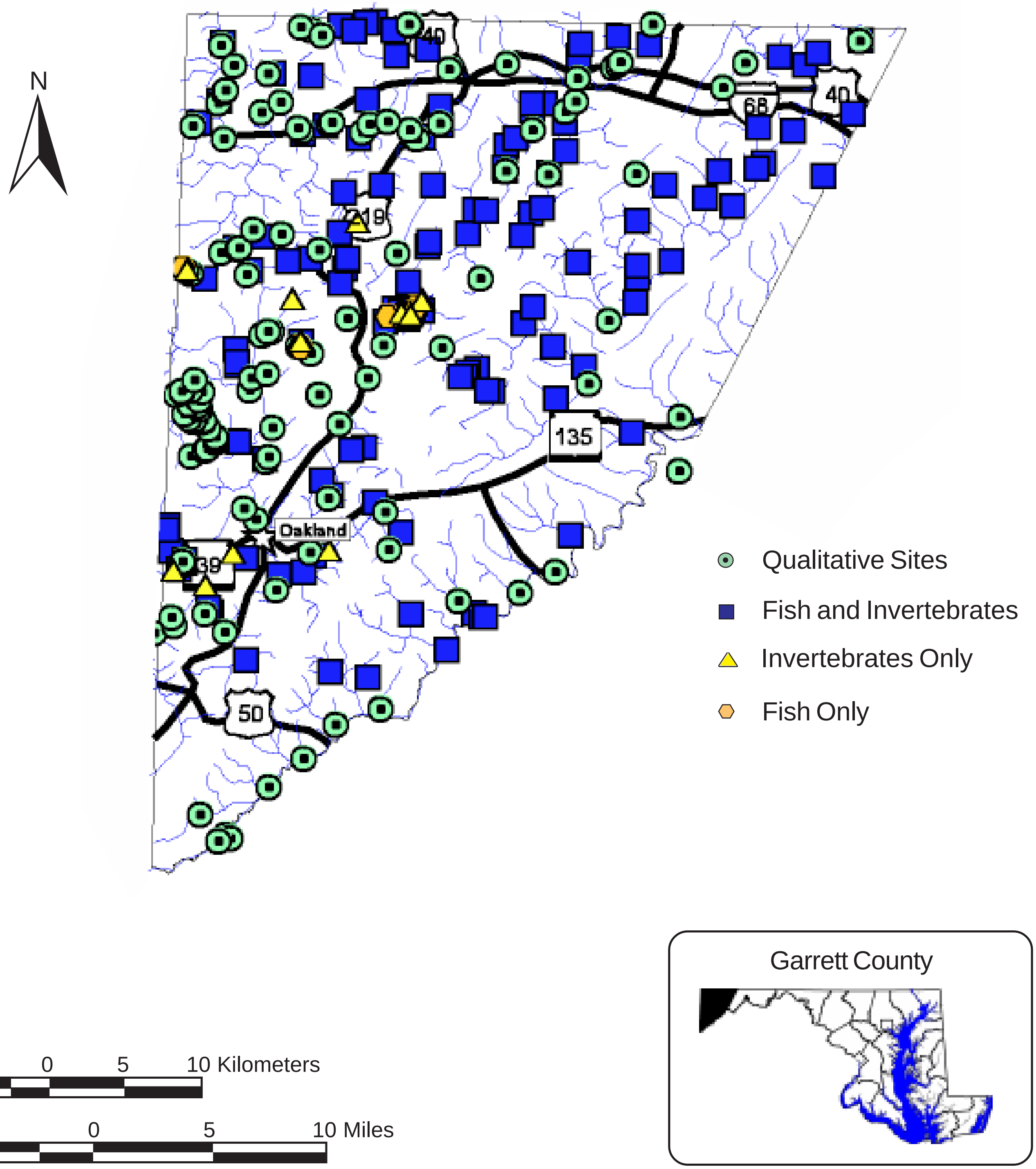

Figure 2. Location of Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Table 2. Percent occurrence of fish species collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Family	Common Name	Scientific Name	Number of Occurrences	Percent Occurrence
Cyprinidae	central stoneroller	*Campostoma anomalum*	11	7.80
	rosyside dace	*Clinostomus funduloides*	2	1.42
	spotfin shiner [1]	*Cyprinella spiloptera*		
	cutlips minnow	*Exoglossum maxillingua*	6	4.26
	striped shiner	*Luxilus chrysocephalus*	7	4.96
	common shiner	*Luxilus cornutus*	11	7.80
	river chub	*Nocomis micropogon*	22	15.60
	golden shiner	*Notemigonus crysoleucas*	13	9.22
	spottail shiner [1]	*Notropis hudsonius*		
	bluntnose minnow	*Pimephales notatus*	7	4.96
	fathead minnow	*Pimephales promelas*	8	5.67
	blacknose dace	*Rhinichthys atratulus*	91	64.54
	longnose dace	*Rhinichthys cataractae*	42	29.79
	creek chub	*Semotilus atromaculatus*	83	58.87
	fallfish [1]	*Semotilus corporalis*		
Catostomidae	white sucker	*Catostomus commersoni*	72	51.06
	northern hogsucker	*Hypentelium nigricans*	15	10.64
	golden redhorse [1]	*Moxostoma erythrurum*		
Ictaluridae	yellow bullhead	*Ameiurus natalis*	4	2.84
	brown bullhead	*Ameiurus nebulosus*	14	9.93
	margined madtom	*Noturus insignis*	3	2.13
Esocidae	redfin pickerel	*Esox americanus vermiculatus*	5	3.55
	northern pike	*Esox lucius*	1	0.71
	chain pickerel	*Esox niger*	5	3.55
Salmonidae	cutthroat trout	*Oncorhynchus clarki*	3	2.13
	rainbow trout	*Oncorhynchus mykiss*	11	7.80
	brown trout	*Salmo trutta*	20	14.18
	brook trout	*Salvelinus fontinalis*	51	36.17
Cottidae	mottled sculpin	*Cottus bairdi*	76	53.90
	Potomac sculpin	*Cottus girardi*	9	6.38
Centrarchidae	rock bass	*Ambloplites rupestris*	24	17.02
	green sunfish	*Lepomis cyanellus*	3	2.13
	pumpkinseed	*Lepomis gibbosus*	29	20.57
	bluegill	*Lepomis machrochirus*	14	9.93
	smallmouth bass	*Micropterus dolomieu*	13	9.22
	largemouth bass	*Micropterus salmoides*	14	9.93
Percidae	greenside darter [1]	*Etheostoma blennioides*		
	rainbow darter [1]	*Etheostoma caeruleum*		
	fantail darter	*Etheostoma flabellare*	11	7.80
	johnny darter	*Etheostoma nigrum*	18	12.77
	yellow perch	*Perca flavescens*	8	5.67
None			27	19.15

[1] Qualitative Sites

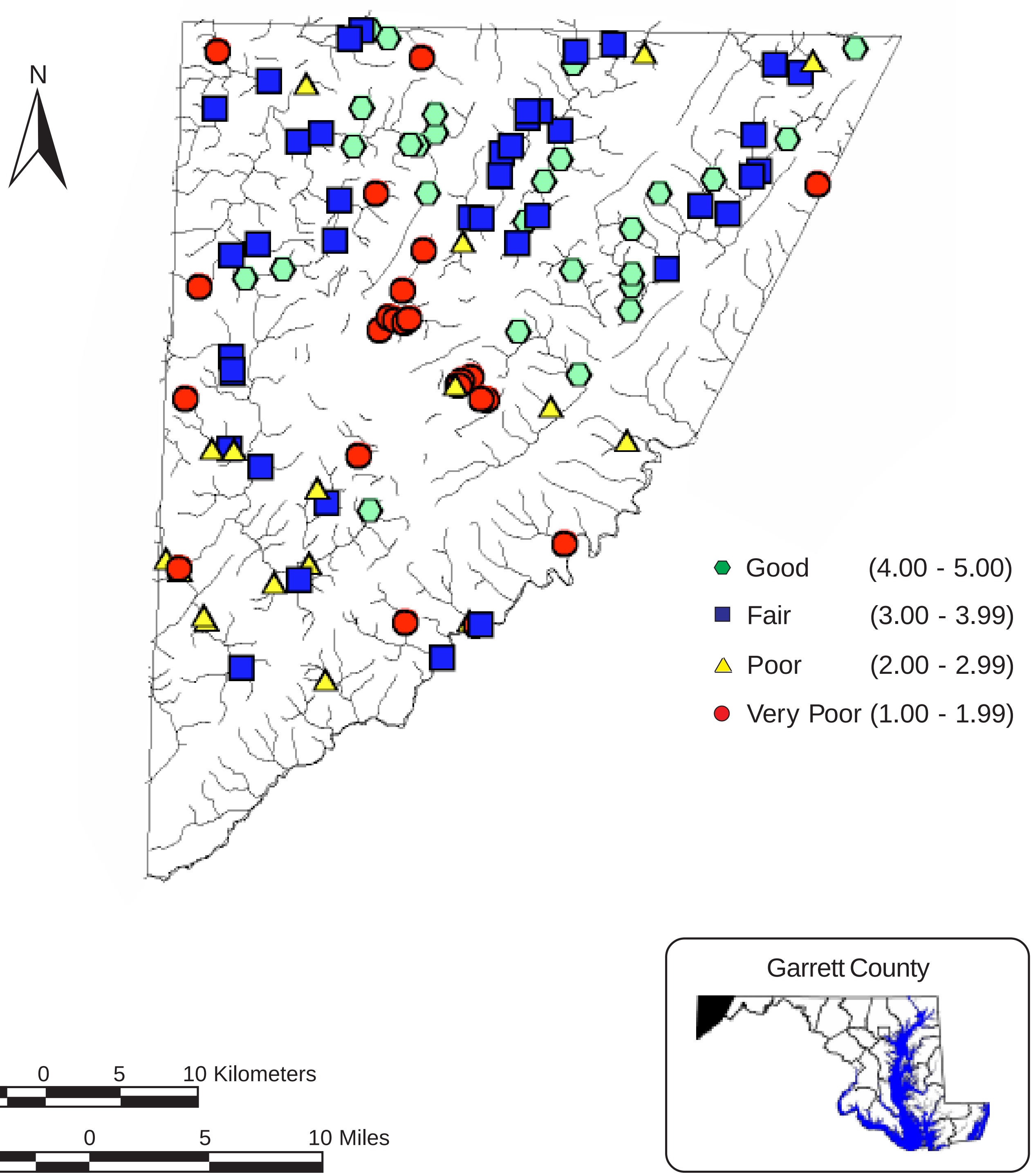

Figure 3. Stream ecological conditions based on the Fish Index of Biotic Integrity (F-IBI) at Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Table 3. Tolerance Value (TV)[1], Functional Feeding Group (FFG), Habit, and Percent Occurrence of benthic macroinvertebrate taxa[2] collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Abbreviations of habits are as follows: bu - burrower, cn - clinger, cb - climber, sp - sprawler, dv - diver, and sk - skater.

Class	Order	Family	Genus	TV	FFG	Habit	Percent Occurrence
Nematomorpha[3]						bu	0.74
Enopla	Hoplonemertea	Tetrastemmatidae	*Prostoma* Sp.		Predator		0.74
Turbellaria				4	Predator	sp	0.74
	Tricladida	Planariidae	*Cura* Sp.			sp	0.74
			Dugesia Sp.	7	Predator	sp	1.48
Oligochaeta				10	Collector	bu	0.74
	Lumbriculida	Lumbriculidae		10	Collector	bu	16.30
Oligochaeta	Tubificida	Enchytraeidae		10	Collector	bu	2.96
		Naididae		10	Collector	bu	12.59
		Tubificidae		10	Collector	cn	6.67
Hirudinea	Pharyngobdellida	Erpobdellidae		10	Predator	sp	0.74
Hirudinea	Rhynchobdellida	Glossiphoniidae			Predator	sp	0.74
Gastropoda	Basommatophora	Ancylidae	*Fissia* Sp.	7	Scraper	cb	0.74
		Physidae	*Physella* Sp.	8	Scraper	cb	2.96
Pelecypoda	Veneroida	Corbiculidae	*Corbicula* Sp.	6	Filterer	bu	0.74
		Sphaeriidae			Filterer	bu	2.22
			Pisidium Sp.	8	Filterer	bu	4.44
			Sphaerium Sp.	8	Filterer	bu	2.22
Malacostraca	Amphipoda	Crangonyctidae	*Crangonyx* Sp.	4	Collector	sp	2.96
		Gammaridae	*Gammarus* Sp.	6	Shredder	sp	5.19
		Hyalellidae	*Hyalella* Sp.	6	Shredder	sp	3.70
Malacostraca	Decapoda	Cambaridae		6	Shredder	sp	9.63
			Cambarus Sp.	6	Collector	sp	5.93
			Orconectes Sp.	6	Shredder	sp	0.74
Malacostraca	Isopoda			8	Collector		0.74
		Asellidae	*Caecidotea* Sp.	8	Collector	sp	8.89
Insecta	Collembola						0.74
Insecta	Ephemeroptera	Ameletidae	*Ameletus* Sp.	0	Collector	sw, cb	10.37
		Baetidae			Collector	sw, cn	14.07
			Acentrella Sp.	4	Collector	sw, cn	2.22
			Acerpenna Sp.	4	Collector	sw, cn	13.33
			Baetis Sp.	6	Collector	sw, cb, cn	23.70
			Barbaetis Sp.	10	Collector		0.74
			Centroptilum Sp.	2	Collector	sw, cn	2.96
			Diphetor Sp.		Collector	sw, cn	1.48
		Ephemerellidae				cn, sp, sw	0.74
			Drunella Sp.	1	Scraper	cn, sp	1.48
			Ephemerella Sp.	2	Collector	cn, sw	65.93
			Eurylophella Sp.	4	Scraper	cn, sp	11.85
			Satella Sp.	2	Collector	cn	10.37
			Timpanoga Sp.	2	Collector	sp	0.74
		Ephemeridae	*Ephemera* Sp.	3	Collector	bu	5.93
			Hexagenia Sp.	6	Collector	bu	0.74
		Heptageniidae			Scraper	cn	2.22
			Cinygmula Sp.		Scraper	cn	19.26
			Epeorus Sp.	0	Scraper	cn	39.26
			Heptagenia Sp.	4	Scraper	cn, sw	4.44

Table 3 (cont.). Tolerance Value (TV)[1], Functional Feeding Group (FFG), Habit, and Percent Occurrence of benthic macroinvertebrate taxa[2] collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Abbreviations of habits are as follows: bu - burrower, cn - clinger, cb - climber, sp - sprawler, dv - diver, and sk - skater.

Class	Order	Family	Genus	TV	FFG	Habit	Percent Occurrence
			Stenacron Sp.	4	Collector	cn	13.33
			Stenonema Sp.	4	Scraper	cn	38.52
		Isonychiidae	*Isonychia* Sp.	2	Filterer	sw, cn	4.44
		Leptophlebiidae			Collector	sw, cn	3.70
			Leptophlebia Sp.	4	Collector	sw, cn, sp	2.96
			Paraleptophlebia Sp.	2	Collector	sw, cn, sp	42.96
		Siphlonuridae	*Siphlonurus* Sp.	7	Collector	sw, cb	1.48
Insecta	Odonata	Aeshnidae	*Boyeria* Sp.	2	Predator	cb, sp	2.96
		Calopterygidae	*Calopteryx* Sp.	6	Predator	cb	1.48
		Coenagrionidae	*Argia* Sp.	8	Predator	cn, cb, sp	0.74
		Cordulegastridae	*Cordulegaster* Sp.	3	Predator	bu	0.74
		Gomphidae			Predator	bu	2.96
			Gomphus Sp.	5	Predator	bu	0.74
			Lanthus Sp.	6	Predator	bu	2.22
		Libellulidae	*Leucorrhinia* Sp.		Predator	cb	0.74
Insecta	Plecoptera	Capniidae			Shredder	sp, cn	0.74
			Allocapnia Sp.	3	Shredder	cn	1.48
			Paracapnia Sp.	1	Shredder	-	2.22
		Chloroperlidae			Predator	cn	14.81
			Alloperla Sp.		Predator	cn	0.74
			Haploperla Sp.		Predator	cn	8.15
			Sweltsa Sp.		Predator	cn	11.85
		Leuctridae			Shredder	sp, cn	3.70
			Leuctra Sp.	0	Shredder	cn	66.67
			Paraleuctra Sp.		Shredder	sp, cn	0.74
		Nemouridae			Shredder	sp, cn	8.89
			Amphinemura Sp.	3	Shredder	sp, cn	62.96
			Ostrocerca Sp.		Shredder	sp, cn	11.85
			Prostoia Sp.		Shredder	sp, cn	0.74
			Soyedina Sp.		Shredder	sp, cn	2.22
		Peltoperlidae			Shredder	cn, sp	1.48
			Peltoperla Sp.		Shredder	cn, sp	7.41
			Tallaperla Sp.		Shredder	cn, sp	14.81
		Perlidae			Predator	cn	5.19
			Acroneuria Sp.	0	Predator	cn	24.44
			Neoperla Sp.	3	Predator	cn	0.74
			Paragnetina Sp.	1	Predator	cn	1.48
			Phasganophora Sp.		Predator	cn	1.48
		Perlodidae			Predator	cn	21.48
			Clioperla Sp.	1	Predator	cn	5.19
			Cultus Sp.		Predator	cn	1.48
			Diploperla Sp.		Predator	cn	6.67
			Isoperla Sp.	2	Predator	cn, sp	30.37
			Malirekus Sp.		Predator	cn	2.96
		Pteronarcyidae	*Pteronarcys* Sp.	2	Shredder	cn, sp	19.26
		Taeniopterygidae	*Oemopteryx* Sp.		Shredder	sp, cn	1.48
Insecta	Hemiptera	Veliidae	*Microvelia* Sp.	6	Predator	skater	0.74

Table 3 (cont.). Tolerance Value (TV)[1], Functional Feeding Group (FFG), Habit, and Percent Occurrence of benthic macroinvertebrate taxa[2] collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Abbreviations of habits are as follows: bu - burrower, cn - clinger, cb - climber, sp - sprawler, dv - diver, and sk - skater.

Class	Order	Family	Genus	TV	FFG	Habit	Percent Occurrence
Insecta	Megaloptera	Corydalidae	*Chauliodes* Sp.	4	Predator	cn, cb	0.74
			Nigronia Sp.	0	Predator	cn, cb	19.26
		Sialidae		4	Predator	bu, cb, cn	0.74
			Sialis Sp.	4	Predator	bu, cb, cn	5.93
Insecta	Trichoptera	Brachycentridae		1	Filterer		0.74
			Brachycentrus Sp.	1	Filterer	cn	0.74
			Micrasema Sp.	2	Shredder	cn, sp	5.19
		Dipseudopsidae	*Phylocentropus* Sp.	5	Collector	bu	1.48
		Glossosomatidae	*Glossosoma* Sp.	0	Scraper	cn	2.96
		Hydropsychidae	*Cheumatopsyche* Sp.	5	Filterer	cn	40.74
			Diplectrona Sp.	2	Filterer	cn	37.78
			Hydropsyche Sp.	6	Filterer	cn	44.44
			Parapsyche Sp.	1	Filterer	cn	0.74
		Lepidostomatidae	*Lepidostoma* Sp.	3	Shredder	cb, sp, cn	11.11
		Leptoceridae		4	Collector		0.74
			Nectopsyche Sp.	3	Shredder	cb, sw	0.74
			Oecetis Sp.	8	Predator	cn, sp, cb	0.74
		Limnephilidae			Shredder	cb, sp, cn	3.70
			Goera Sp.		Scraper	cn	1.48
			Hydatophylax Sp.	2	Shredder	sp, cb	0.74
			Limnephilus Sp.	3	Shredder	cb, sp, cn	0.74
			Platycentropus Sp.	4	Shredder	cb	1.48
			Pycnopsyche Sp.	4	Shredder	sp, cb, cn	11.85
		Molannidae	*Molanna* Sp.	6	Scraper	sp, cn	0.74
		Odontoceridae	*Psilotreta* Sp.	0	Scraper	sp	3.70
		Philopotamidae	*Chimarra* Sp.	4	Filterer	cn	8.89
			Dolophilodes Sp.	0	Filterer	cn	11.85
			Wormaldia Sp.		Filterer	cn	7.41
		Phryganeidae	*Ptilostomis* Sp.	5	Shredder	cb	4.44
		Polycentropodidae				cn	0.74
			Neureclipsis Sp.	7	Filterer	cn	0.74
			Nyctiophylax Sp.	5	Filterer	cn	0.74
			Polycentropus Sp.	5	Filterer	cn	10.37
		Psychomyiidae	*Lype* Sp.	2	Scraper	cn	4.44
			Psychomyia Sp.	2	Collector	cn	2.96
		Rhyacophilidae	*Rhyacophila* Sp.	1	Predator	cn	45.93
		Uenoidae	*Neophylax* Sp.	3	Scraper	cn	35.56
Insecta	Lepidoptera	Pyralidae			Shredder	cb	0.74
Insecta	Coleoptera	Dryopidae	*Helichus* Sp.	5	Scraper	cn	0.74
		Dytiscidae		5	Predator	sw, dv	0.74
			Hydroporus Sp.	5	Predator	sw, cb	1.48
		Elmidae		5	Collector	cn	0.74
			Dubiraphia Sp.	6	Scraper	cn, cb	13.33
			Optioservus Sp.	4	Scraper	cn	19.26
			Oulimnius Sp.	2	Scraper	cn	20.74
			Promoresia Sp.	2	Scraper	cn	5.93
			Stenelmis Sp.	6	Scraper	cn	4.44

Table 3 (cont.). Tolerance Value (TV)[1], Functional Feeding Group (FFG), Habit, and Percent Occurrence of benthic macroinvertebrate taxa[2] collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Abbreviations of habits are as follows: bu - burrower, cn - clinger, cb - climber, sp - sprawler, dv - diver, and sk - skater.

Class	Order	Family	Genus	TV	FFG	Habit	Percent Occurrence
		Hydrophilidae	*Hydrochus* Sp.		Shredder	cb	0.74
		Psephenidae	*Ectopria* Sp.	5	Scraper	cn	2.96
			Psephenus Sp.	4	Scraper	cn	0.74
		Ptilodactylidae	*Anchytarsus* Sp.	4	Shredder	cn	4.44
		Scirtidae	*Cyphon* Sp.	7	Scraper	cb	0.74
Insecta	Diptera						1.48
		Athericidae	*Atherix* Sp.	2	Predator	sp, bu	3.70
		Blephariceridae	*Blepharicera* Sp.		Scraper	cn	6.67
		Ceratopogonidae	*Bezzia* Sp.	6	Predator	bu	9.63
			Ceratopogon Sp.	6	Predator	sp, bu	7.41
			Helius Sp.	4	Predator	sp, bu	0.74
			Probezzia Sp.	6	Predator	bu	11.11
			Sphaeromias Sp.		Predator	bu	1.48
		Chironomidae	*Ablabesmyia* Sp.	8	Predator	sp	2.22
			Brillia Sp.	5	Shredder	bu, sp	13.33
			Cardiocladius Sp.	6	Predator	bu, cn	0.74
			Chaetocladius Sp.	6	Collector	sp	0.74
			Chironomus Sp.	10	Collector	bu	2.22
			Conchapelopia Sp.	6	Predator	sp	27.41
			Corynoneura Sp.	7	Collector	sp	8.15
			Cricotopus Sp.	7	Shredder	cn, bu	7.41
			Cricotopus/ Orthocladius Sp.		Shredder		13.33
			Cryptochironomus Sp.	8	Predator	sp, bu	2.22
			Diamesa Sp.	5	Collector	sp	11.85
			Dicrotendipes Sp.	10	Collector	bu	2.22
			Diplocladius Sp.	7	Collector	sp	1.48
			Endochironomus Sp.	10	Shredder	cn	1.48
			Eukiefferiella Sp.	8	Collector	sp	43.70
			Heleniella Sp.		Predator	sp	2.22
			Heterotrissocladius Sp.		Collector	sp, bu	5.93
			Hydrobaenus Sp.	8	Scraper	sp	1.48
			Krenopelopia Sp.		Predator	sp	1.48
			Labrundinia Sp.	7	Predator	sp	1.48
			Larsia Sp.	6	Predator	sp	2.96
			Lopescladius Sp.		Collector	sp	0.74
			Micropsectra Sp.	7	Collector	cb, sp	30.37
			Microtendipes Sp.	6	Filterer	cn	14.81
			Nanocladius Sp.	3	Collector	sp	2.96
			Natarsia Sp.	8	Predator	sp	1.48
			Orthocladiinae A Sp.		Collector		0.74
			Orthocladius Sp.	6	Collector	sp, bu	17.78
			Pagastia Sp.	1	Collector	-	3.70
			Parachaetocladius Sp.	2	Collector	sp	0.74
			Paracladopelma Sp.	7	Collector	sp	0.74
			Paramerina Sp.	4	Predator	sp	0.74
			Parametriocnemus Sp.	5	Collector	sp	65.93

Table 3 (cont.). Tolerance Value (TV)[1], Functional Feeding Group (FFG), Habit, and Percent Occurrence of benthic macroinvertebrate taxa[2] collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Abbreviations of habits are as follows: bu - burrower, cn - clinger, cb - climber, sp - sprawler, dv - diver, and sk - skater.

Class	Order	Family	Genus	TV	FFG	Habit	Percent Occurrence
			Paraphaenocladius Sp.	4	Collector	sp	2.96
			Paratanytarsus Sp.	6	Collector	sp	5.19
			Paratendipes Sp.	8	Collector	bu	0.74
			Phaenopsectra Sp.	7	Collector	cn	0.74
			Polypedilum Sp.	6	Shredder	cb, cn	26.67
			Potthastia Sp.	2	Collector	sp	1.48
			Procladius Sp.	9	Predator	sp	2.22
			Prodiamesa Sp.	3	Collector	bu, sp	0.74
			Psectrocladius Sp.	8	Shredder	sp, bu	0.74
			Pseudorthocladius Sp.	0	Collector	sp	2.22
			Rheocricotopus Sp.	6	Collector	sp	7.41
			Rheopelopia Sp.	4	Predator	sp	0.74
			Rheotanytarsus Sp.	6	Filterer	cn	11.85
			Stempellinella Sp.	4	Collector	cb, sp, cn	2.96
			Stenochironomus Sp.	5	Shredder	bu	0.74
			Stictochironomus Sp.	9	Collector	bu	2.22
			Sublettea Sp.		Collector	-	1.48
			Symposiocladius Sp.		Predator	sp	5.93
			Tanytarsus Sp.	6	Filterer	cb, cn	28.15
			Thienemanniella Sp.	6	Collector	sp	15.56
			Thienemannimyia Sp.		Predator	sp	17.04
			Tribelos Sp.	5	Collector	bu	0.74
			Trissopelopia Sp.		Predator	sp	5.93
			Tvetenia Sp.	5	Collector	sp	12.59
			CHIRONOMINI	6	Collector		0.74
			ORTHOCLADIINAE		Collector		5.19
			TANYPODINAE		Predator		0.74
			TANYTARSINI		Collector		2.22
			Xylotopus Sp.	2	Shredder	bu	0.74
			Zavrelimyia Sp.	8	Predator	sp	3.70
		Dixidae	*Dixa* Sp.	4	Predator	sw, cb	0.74
		Empididae			Predator	sp, bu	1.48
			Chelifera Sp.		Predator	sp, bu	11.85
			Clinocera Sp.		Predator	cn	3.70
			Hemerodromia Sp.	6	Predator	sp, bu	10.37
		Ephydridae			Collector	bu, sp	0.74
		Simuliidae		7	Filterer	cn	0.74
			Prosimulium Sp.	7	Filterer	cn	52.59
			Simulium Sp.	7	Filterer	cn	9.63
			Stegopterna Sp.	7	Filterer	cn	22.22
		Stratiomyidae	*Stratiomys* Sp.	4	Collector	sp, bu	0.74
		Tabanidae	*Chrysops* Sp.	7	Predator	sp, bu	5.93
			Tabanus Sp.	5	Predator	sp, bu	4.44
		Tipulidae			Predator	bu, sp	1.48
			Antocha Sp.	5	Collector	cn	18.52
			Cryptolabis Sp.			bu	0.74
			Dicranota Sp.	4	Predator	sp, bu	39.26

Table 3 (cont.). Tolerance Value (TV)[1], Functional Feeding Group (FFG), Habit, and Percent Occurrence of benthic macroinvertebrate taxa[2] collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Abbreviations of habits are as follows: bu - burrower, cn - clinger, cb - climber, sp - sprawler, dv - diver, and sk - skater.

Class	Order	Family	Genus	TV	FFG	Habit	Percent Occurrence
			Hexatoma Sp.	4	Predator	bu, sp	27.41
			Limnophila Sp.	4	Predator	bu	0.74
			Limonia Sp.	6	Shredder	bu, sp	1.48
			Molophilus Sp.			bu	0.74
			Ormosia Sp.		Collector	bu	5.93
			Pilaria Sp.	7	Predator	bu	0.74
			Pseudolimnophila Sp.	2	Predator	bu	13.33
			Tipula Sp.	4	Shredder	bu	14.81

1 Tolerance values are on a 0 (extremely sensitive) to 10 (tolerant) scale.
2 Taxa not identified to genus are presented in capital letters. Subfamily - Tanypodinae, Orthocladiinae; Tribe - Chironomini, Tanytarsini.
3 Nematomorpha is a phylum level identification. No further identification was made.

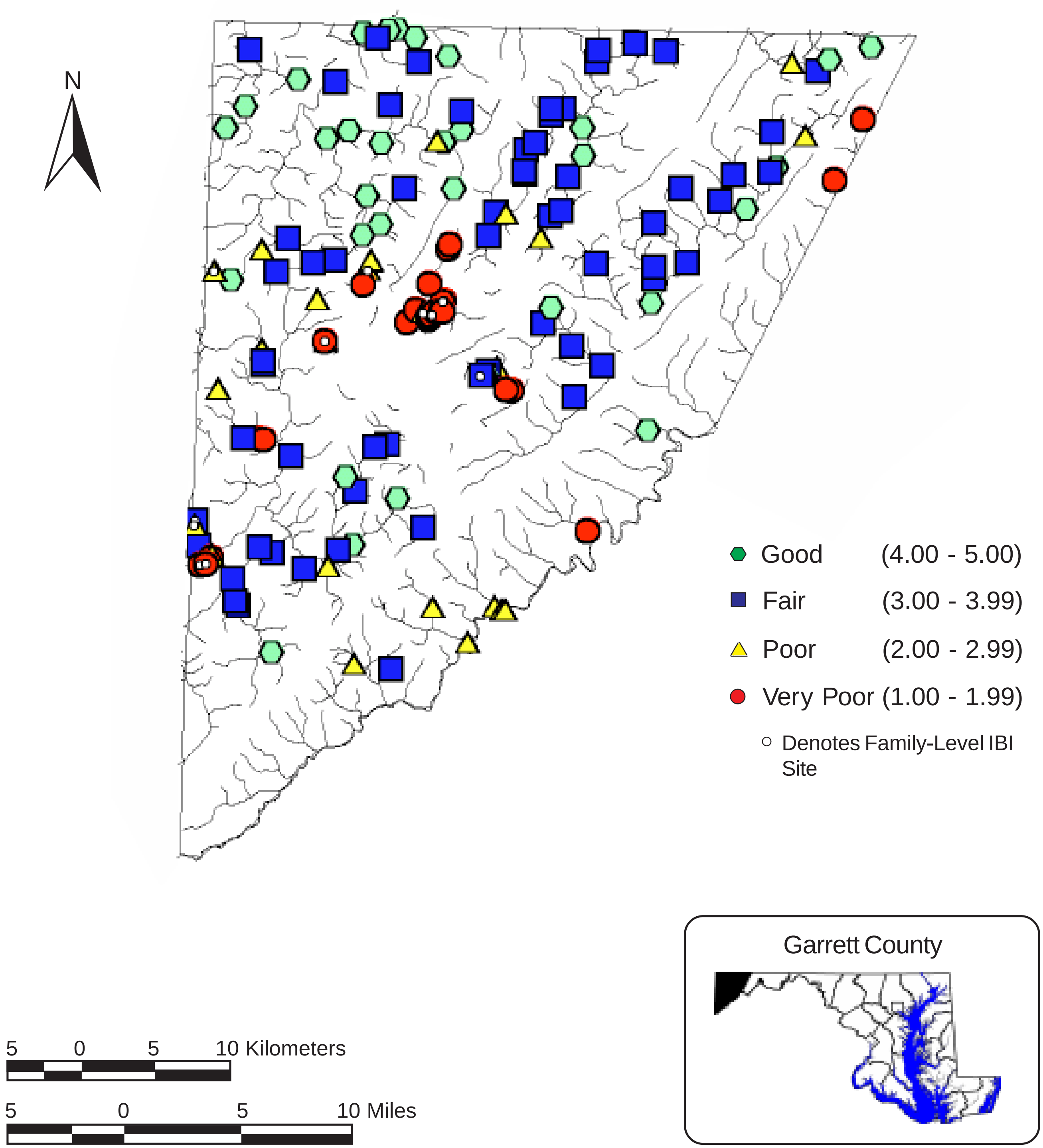

Figure 4. Stream ecological conditions based on the Benthic Macroinvertebrate Index of Biotic Integrity (B-IBI) at Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Table 4. Percent occurrence of reptile and amphibian species collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Family	Common Name	Scientific Name	Number of Occurrences	Percent Occurrence
Ambystomatidae	Jefferson salamander	*Ambystoma jeffersonianum*	1	0.71
Salamandridae	red spotted newt	*Notopthalmus v. viridescens*	8	5.67
Plethodontidae	longtail salamander	*Eurycea l. longicauda*	3	2.13
	mountain dusky salamander	*Desmognathus ochrophaeus*	49	34.75
	northern dusky salamander	*Desmognathus f. fuscus*	51	36.17
	northern two-lined salamander	*Eurycea bislineata*	29	20.57
	northern slimy salamander	*Plethodon glutinosus*	14	9.93
	northern spring salamander	*Gyrinophilus p. porphyriticus*	11	7.80
	red salamander	*Pseudotriton ruber*	10	7.09
	redback salamander	*Plethodon cinereus*	11	7.80
Phrynosomatidae	seal salamander	*Sceloporus undulatus hyacinthinus*	17	12.06
Bufonidae	American toad	*Bufo americanus*	4	2.84
Hylidae	northern spring peeper	*Pseudacris c. crucifer*	1	0.71
Ranidae	bullfrog	*Rana catesbeiana*	1	0.71
	green frog	*Rana clamitans melanota*	30	21.28
	pickerel frog	*Rana palaustris*	6	4.26
	wood frog	*Rana sylvatica*	6	4.26
Chelydridae	common snapping turtle	*Chelydra serpentina*	2	1.42
Colubridae	eastern garter snake	*Thamnophis s. sirtalis*	4	2.84
	northern ringneck snake	*Diadophis punctatus edwardsii*	1	0.71
	northern water snake	*Nerodia s. sipedon*	10	7.09
	queen snake	*Regina septemvittata*	1	0.71
	smooth green snake	*Opheodrys vernalis*	1	0.71
None			27	19.15

Table 5. Physical habitat data for Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Site	Instream Habitat[1]	Epifaunal Substrate[1]	Velocity/Depth Diversity[1]	Pool Quality[1]	Riffle Quality[1]	Percent Embeddedness[1]	Percent Shading[1]	Maximum Depth (cm)[1]	Number of Woody Debris	Number of Rootwads	Percent Channel Flow[1]	Channel Alteration[1]	Bank Stability[1]	Riparian Width (m)[1]	Aesthetic Rating[1]
AL-A-229-109-96	11	8	8	9	9	60	96	26	4	0	70	18	19	50	20
AL-A-567-126-96	9	1	11	15	4	75	97	58	7	1	90	1	18	50	5
GA-A-001-105-95	2	3	6	2	6	40	95	15	3	0	35	5	15	5	15
GA-A-002-312-96	18	12	15	16	16	40	45	89	0	0	95	16	18	50	19
GA-A-008-213-96	18	19	10	16	18	25	88	46	1	0	90	17	17	50	16
GA-A-010-205-95	5	1	6	4	2	65	98	19	1	0	85	5	15	0	16
GA-A-011-2-94	17	18	12	12	15	10	97	64	0		70	19	18	13	17
GA-A-011-3-94	18	16	8	16	15	25	90	34	0		80	19	18	28	19
GA-A-011-301-97	16	3	12	16	2	75	95	50	0	0	90	16	19	19	5
GA-A-011-317-97	13	3	9	12	0	45	10	73	12	0	95	5	16	50	15
GA-A-017-223-96	14	5	17	18	13	60	30	64	7	0	98	19	16	0	13
GA-A-021-1-94	18	14	6	16	6	65	99	32	7		90	19	19	50	20
GA-A-021-2-94	16	5	13	17	6	100	60	50	16		100	19	19	50	20
GA-A-022-215-96	15	12	12	11	9	35	97	51	1	2	65	7	15	50	19
GA-A-027-3-94	7	3	4	18	0	100	40	140	5		95	4	13	50	20
GA-A-027-4-94	5	3	4	16	0	100	50	82	7		95	5	12	50	20
GA-A-028-117-97	10	9	7	11	11	25	95	26	1	0	100	17	16	0	12
GA-A-030-213-97	15	11	7	8	5	10	40	28	0	2	90	6	19	50	9
GA-A-039-307-97	17	16	12	15	14	15	90	64	0	0	75	19	17	15	18
GA-A-050-201-97	16	7	10	15	12	35	40	48	3	2	100	5	8	0	8
GA-A-053-206-96	16	17	7	14	15	35	92	46	0	0	96	14	17	0	20
GA-A-059-216-97	15	13	9	11	13	25	95	41	0	0	70	17	18	50	19
GA-A-059-225-97	16	17	14	16	15	25	90	99	1	1	50	17	16	50	20
GA-A-062-202-95	17	16	18	17	17	25	95	71	0	0	80	16	18	50	19
GA-A-062-203-97	18	18	12	16	16	15	95	68	1	0	70	20	17	50	20
GA-A-062-222-95	17	16	15	20	17	20	92	126	1	0	80	17	18	50	16
GA-A-076-209-96	18	17	15	17	19	50	75	82	2	2	94	16	18	50	17
GA-A-089-1-94	3	3	3	16	8	100	5	34	0		100	20	2	0	16
GA-A-089-2-94	11	5	11	16	8	65	50	56	0		87	18	7	6	16
GA-A-090-310-96	16	16	12	11	14	25	85	42	0	1	80	8	16	13	18
GA-A-094-303-97	20	18	16	16	18	15	85	96	2	0	70	18	17	50	19
GA-A-105-317-96	15	5	13	17	17	100	45	62	0	0	97	19	19	16	20
GA-A-105-318-96	15	4	11	16	16	100	40	58	0	0	97	18	17	50	20
GA-A-107-209-97	15	18	12	15	14	15	95	67	1	0	50	19	18	50	18
GA-A-111-316-95	15	4	9	17	4	40	97	78	8	3	98	5	15	19	12
GA-A-112-101-97	6	5	5	5	3	25	80	15	4	0	40	8	19	0	16

Table 5 (cont.). Physical habitat data for Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Site	Instream Habitat[1]	Epifaunal Substrate[1]	Velocity/Depth Diversity[1]	Pool Quality[1]	Riffle Quality[1]	Percent Embeddedness[1]	Percent Shading[1]	Maximum Depth (cm)[1]	Number of Woody Debris	Number of Rootwads	Percent Channel Flow[1]	Channel Alteration[1]	Bank Stability[1]	Riparian Width (m)[1]	Aesthetic Rating[1]
GA-A-120-103-95	17	15	14	19	15	20	90	114	10	6	90	15	15	50	20
GA-A-121-210-96	17	18	10	16	13	50	77	32	1	2	75	9	18	50	19
GA-A-128-217-95	10	5	9	11	5	100	80	49	13	0	95	5	5	0	16
GA-A-130-110-97	8	11	6	8	6	20	95	48	1	0	50	15	18	12	15
GA-A-133-112-96	16	16	10	12	9	30	50	36	1	0	65	10	18	0	16
GA-A-141-213-95	17	16	10	16	16	35	50	37	3	0	90	10	16	50	19
GA-A-142-118-95	11	1	6	3	3	60	90	10	4	1	60	2	10	4	16
GA-A-143-1-94	5	1	13	18	9	100	90	50	1		97	19	1	0	16
GA-A-143-105-97	16	5	14	15	12	50	55	72	7	0	100	5	17	0	13
GA-A-143-5-94	2	1	6	17	0	100	8	92	17		98	16	15	0	17
GA-A-152-1-94	11	11	6	8	8	50	97	18	3		75	7	16	50	20
GA-A-152-5-94	16	15	7	7	10	70	97	20	2		60	2	16	8	16
GA-A-159-202-96	18	7	13	16	11	100	65	58	1	0	60	14	18	50	19
GA-A-179-113-95	12	3	7	6	4	100	95	24	1	0	40	5	17	0	14
GA-A-181-1-94	16	13	18	17	16	30	50	76	10		97	8	8	20	2
GA-A-181-2-94	17	5	12	19	16	60	50	89	22		87	8	6	0	3
GA-A-181-303-95	13	8	10	11	16	35	50	34	5	0	80	16	15	0	6
GA-A-184-328-96	15	16	13	10	16	30	35	73	1	0	75	18	18	0	10
GA-A-185-309-95	17	9	13	17	15	30	15	68	12	0	98	8	8	50	16
GA-A-185-321-95	17	5	15	18	15	40	35	68	7	1	100	4	5	0	16
GA-A-191-322-96	8	6	12	14	11	100	90	95	0	0	35	19	18	5	19
GA-A-195-203-95	17	12	10	16	15	35	90	34	2	3	90	14	17	8	13
GA-A-200-224-97	14	10	10	14	11	20	50	46	0	0	75	16	19	3	16
GA-A-205-222-96	17	0	12	16	2	100	80	59	0	0	95	16	18	35	1
GA-A-215-2-94	1	1	6	9	0	100	60	92	1		95	0	4	0	4
GA-A-235-215-95	5	3	5	17	0	70	30	48	9	1	97	2	10	50	16
GA-A-235-4-94	12	5	7	11	7	55	70	38	4		85	5	9	24	17
GA-A-235-5-94	15	5	4	18	0	75	20	88	5		100	20	2	50	17
GA-A-236-216-95	17	17	8	10	15	100	95	20	2	0	55	10	17	50	12
GA-A-236-218-95	15	9	9	16	4	35	60	43	7	1	50	8	17	50	18
GA-A-247-111-97	11	16	9	8	11	15	75	38	1	0	75	16	18	50	20
GA-A-251-217-97	10	5	8	14	0	100	70	54	1	0	100	5	14	0	12
GA-A-268-222-97	10	9	8	8	7	10	98	34	0	0	45	17	16	50	20
GA-A-276-106-96	13	12	9	7	11	40	90	49	2	0	65	15	17	50	20
GA-A-279-104-97	8	6	7	6	8	20	95	22	1	0	85	5	17	20	6
GA-A-304-316-97	16	15	11	12	15	10	90	69	0	0	75	18	15	50	20

Table 5 (cont.). Physical habitat data for Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Site	Instream Habitat[1]	Epifaunal Substrate[1]	Velocity/Depth Diversity[1]	Pool Quality[1]	Riffle Quality[1]	Percent Embeddedness[1]	Percent Shading[1]	Maximum Depth (cm)[1]	Number of Woody Debris	Number of Rootwads	Percent Channel Flow[1]	Channel Alteration[1]	Bank Stability[1]	Riparian Width (m)[1]	Aesthetic Rating[1]
GA-A-306-210-97	11	5	7	7	6	35	60	20	0	0	75	5	6	0	9
GA-A-309-215-97	9	10	7	7	8	0	95	20	0	0	50	19	18	5	16
GA-A-309-221-97	10	7	10	7	7	35	70	40	0	0	70	9	18	0	15
GA-A-310-318-97	17	15	13	15	16	20	60	69	1	0	80	18	18	50	20
GA-A-314-116-96	6	2	6	5	2	75	85	22	8	1	80	2	15	0	7
GA-A-315-101-96	15	11	10	11	15	40	97	33	0	0	55	18	18	50	20
GA-A-326-106-95	17	10	10	17	17	100	80	43	2	0	100	18	17	50	16
GA-A-343-319-97	16	18	10	10	15	20	75	37	0	1	50	18	19	50	18
GA-A-347-1-94	5	5	2	2	1	70	95	8	0		30	18	16	50	20
GA-A-347-4-94	2	5	6	16	2	80	95	4	0		5	19	16	50	20
GA-A-351-117-95	16	16	15	17	16	15	97	60	1	2	97	18	10	8	10
GA-A-352-212-97	10	6	6	7	8	25	98	26	2	0	85	5	16	3	16
GA-A-358-115-95	12	15	9	10	10	10	98	46	1	0	80	5	18	9	20
GA-A-372-129-96	6	16	6	5	4	25	85	21	3	0	30	16	19	50	20
GA-A-373-220-95	16	6	8	12	10	100	50	41	0	1	80	12	16	0	5
GA-A-395-219-97	15	18	8	11	15	15	85	51	0	1	75	10	18	0	17
GA-A-405-112-95	6	2	6	10	8	65	80	15	3	2	90	4	10	0	6
GA-A-407-310-97	16	14	10	13	12	20	50	49	0	0	50	15	17	50	19
GA-A-407-312-97	16	11	14	18	13	30	45	63	8	0	100	5	17	50	15
GA-A-407-313-97	16	12	13	15	15	35	65	77	3	0	95	5	14	50	16
GA-A-407-314-95	19	19	17	18	19	20	40	99	1	0	95	16	17	50	16
GA-A-409-102-97	12	17	8	8	11	15	95	30	1	0	65	18	19	50	19
GA-A-416-118-96	11	11	7	6	7	50	95	14	0	0	45	6	16	50	20
GA-A-420-323-95	16	5	11	16	6	50	90	50	2	0	40	5	16	50	18
GA-A-420-325-95	16	5	6	16	2	50	85	24	5	1	70	5	15	50	10
GA-A-432-315-95	17	19	14	16	18	25	80	56	7	2	75	10	17	6	16
GA-A-432-320-95	17	18	16	15	18	20	40	54	2	2	70	17	16	31	16
GA-A-439-205-97	14	14	9	10	12	20	35	34	2	2	80	18	17	18	18
GA-A-443-112-97	10	10	8	7	15	35	98	34	0	0	80	17	19	50	20
GA-A-450-113-97	10	12	7	7	6	20	98	22	0	0	50	16	16	50	19
GA-A-453-310-95	18	11	15	18	10	25	15	75	10	1	98	5	5	50	5
GA-A-457-114-95	16	13	9	12	6	45	80	29	1	0	35	5	15	50	17
GA-A-470-306-96	17	8	15	18	16	100	80	113	1	0	85	15	19	50	20
GA-A-470-309-96	16	6	15	17	5	100	75	102	0	0	80	17	18	50	18
GA-A-470-315-96	19	10	15	19	18	60	40	134	1	0	80	17	19	50	18
GA-A-493-109-95	12	5	9	10	12	35	15	28	2	0	80	16	17	0	16

Table 5 (cont.). Physical habitat data for Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Site	Instream Habitat[1]	Epifaunal Substrate[1]	Velocity/Depth Diversity[1]	Pool Quality[1]	Riffle Quality[1]	Percent Embeddedness[1]	Percent Shading[1]	Maximum Depth (cm)[1]	Number of Woody Debris	Number of Rootwads	Percent Channel Flow[1]	Channel Alteration[1]	Bank Stability[1]	Riparian Width (m)[1]	Aesthetic Rating[1]
GA-A-496-105-96	4	2	7	10	6	75	96	22	3	0	95	6	5	0	15
GA-A-505-210-95	17	3	10	16	1	55	35	58	17	0	97	8	13	0	16
GA-A-505-218-97	15	7	12	16	10	35	45	106	2	0	100	5	17	50	16
GA-A-506-106-97	6	7	7	7	4	20	97	24	0	0	10	16	20	50	17
GA-A-511-322-95	16	16	10	15	18	25	70	38	1	1	75	18	19	50	17
GA-A-512-214-96	17	18	10	12	12	45	90	45	2	0	75	10	16	50	19
GA-A-518-220-97	13	7	11	15	15	0	90	50	0	0	75	18	19	50	20
GA-A-520-1-94	2	5	6	1	1	50	95	12	0		10	5	17	50	20
GA-A-520-2-94	2	4	6	1	1	55	93	5	0		10	5	16	50	20
GA-A-521-108-95	14	11	7	16	6	40	50	47	5	0	92	15	15	50	18
GA-A-523-203-96	16	15	13	16	15	60	92	54	0	0	95	12	19	50	20
GA-A-542-304-97	17	16	12	13	16	35	65	54	2	0	95	19	18	50	20
GA-A-542-308-97	17	15	10	15	16	40	75	34	1	0	90	18	18	50	19
GA-A-542-309-97	16	16	12	15	13	40	40	74	0	0	99	19	18	50	20
GA-A-545-301-95	18	19	10	17	19	20	80	48	5	1	90	17	18	33	18
GA-A-545-302-97	16	10	14	14	8	25	60	112	3	0	85	17	18	50	19
GA-A-547-108-97	11	6	10	12	7	100	15	55	4	0	100	5	18	50	19
GA-A-547-5-94	20	18	16	15	19	5	98	68	8		95	18	19	50	19
GA-A-547-8-94	8	2	5	17	0	100	30	98	0		100	20	11	50	17
GA-A-548-2-94	5	2	3	17	0	100	40	105	0		97	5	16	50	20
GA-A-548-3-94	6	2	10	17	16	100	25	63	1		97	5	5	50	19
GA-A-548-317-95	17	11	10	16	5	100	70	86	7	0	100	4	12	50	18
GA-A-551-227-95	6	2	7	16	5	65	75	26	0	0	90	4	15	50	6
GA-A-553-1-94	10	5	13	16	6	100	10	95	13		95	16	11	50	19
GA-A-553-2-94	10	5	6	16	6	100	25	34	13		97	19	11	0	16
GA-A-557-1-94	6	5	6	6	6	20	80	44	0		60	16	15	30	16
GA-A-557-2-94	1	1	6	11	6	100	20	20	0		20	2	2	0	11
GA-A-558-211-96	16	3	13	15	16	45	90	70	0	6	85	10	12	50	16
GA-A-560-201-95	17	16	15	17	17	40	75	81	2	0	85	10	16	50	10
GA-A-563-318-95	14	5	11	16	7	100	45	60	2	0	80	3	15	0	13
GA-A-999-1-94	15	11	13	16	16	20	40	86	6		98	10	3	50	14
GA-A-999-2-94	16	11	13	18	16	65	70	108	8		97	6	5	50	17
GA-A-999-302-96	16	16	13	15	16	25	40	60	0	1	50	18	17	21	11

[1] MBSS Qualitative Habitat Metric - See Appendix B for Guidance

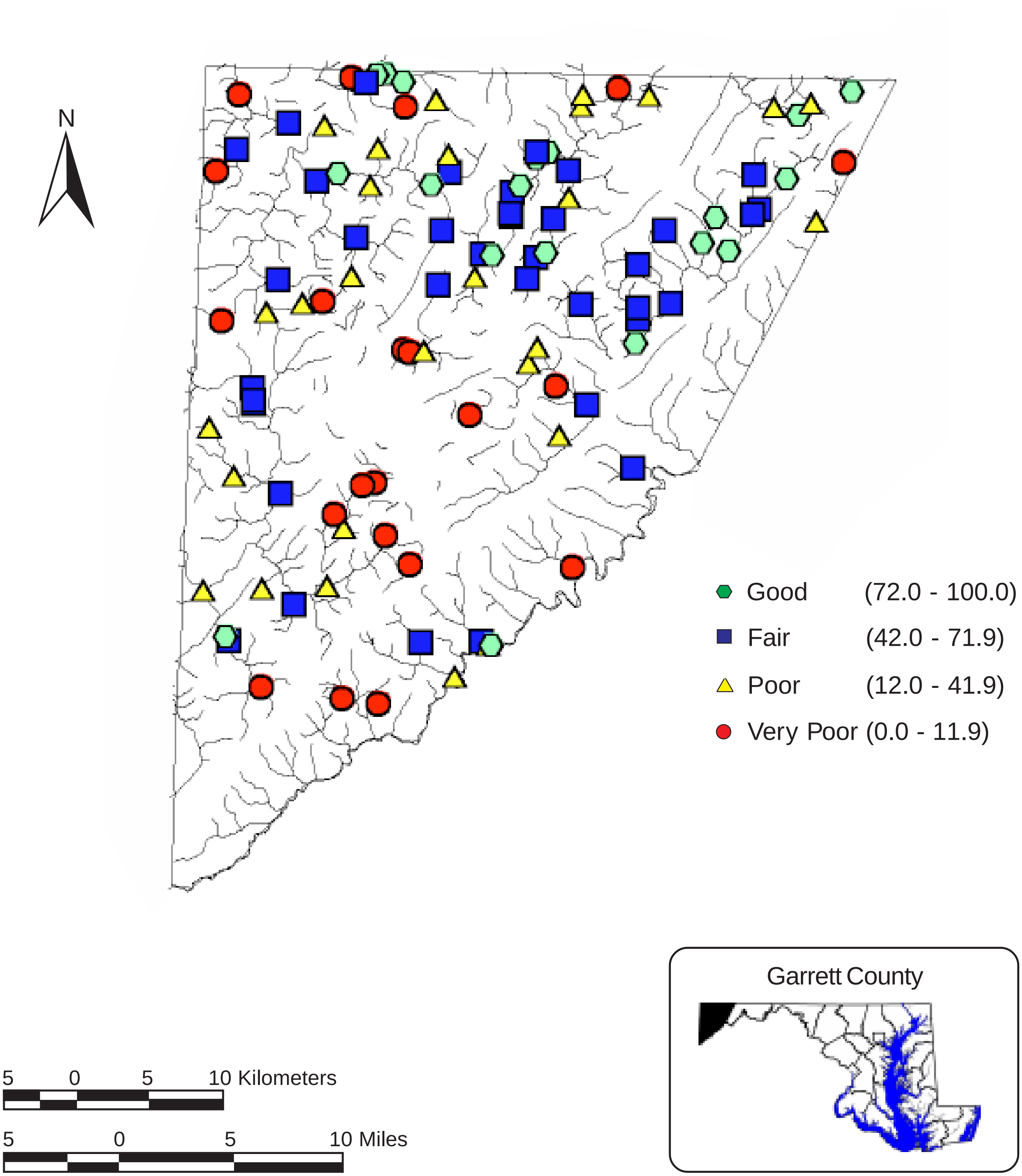

Figure 5. Stream ecological conditions based on the Physical Habitat Index (PHI) at Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Table 6. Fish Index of Biotic Integrity (F-IBI), Benthic Macroinvertebrate Index of Biotic Integrity (B-IBI), Family-Level Benthic Macroinvertebrate Index of Biotic Integrity (Fam. IBI), and Physical Habitat Index (PHI) scores at Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Site	Stream Name	F-IBI	B-IBI	Fam. IBI	PHI
AL-A-229-109-96	Staub Run	1.00	1.9		18.23
AL-A-567-126-96	Un Trib To Sand Spring Run		1.7		8.15
GA-A-001-105-95	Block Run		3.0		3.99
GA-A-002-312-96	Savage R	3.29	4.8		78.31
GA-A-008-213-96	Blue Lick	4.43	3.0		72.64
GA-A-010-205-95	Ut Deep Creek Lake	1.57	3.4		2.74
GA-A-011-1-94	Cherry Cr			2.14	
GA-A-011-2-94	Cherry Cr	1.86	1.4		
GA-A-011-3-94	Cherry Cr				
GA-A-011-301-97	Cherry Cr	1.00	1.4		11.36
GA-A-011-317-97	Cherry Cr	1.29	2.1		9.46
GA-A-017-223-96	Laurel Run	1.57	2.8		54.44
GA-A-021-1-94	Cherry Cr		1.4		
GA-A-021-2-94	Cherry Cr		1.4		
GA-A-022-215-96	Mudlick Run	3.86	3.2		61.90
GA-A-027-1-94	Cherry Cr			1.00	
GA-A-027-2-94	Cherry Cr			1.00	
GA-A-027-3-94	Cherry Cr				
GA-A-027-4-94	Cherry Cr				
GA-A-028-117-97	Un Trib To Little Youghiogheny R		3.7		19.80
GA-A-030-213-97	Piney Cr	3.86	2.3		32.67
GA-A-039-307-97	South Br Bear Cr	3.86	4.3		69.27
GA-A-050-201-97	Trout Run	2.14	3.2		56.96
GA-A-053-206-96	Poplar Lick Run	4.14	3.4		50.87
GA-A-059-216-97	South Br Casselman R	4.14	3.4		49.84
GA-A-059-225-97	South Br Casselman R	3.86	3.9		80.00
GA-A-062-202-95	Mill Run	4.14	4.6		86.26
GA-A-062-203-97	Mill Run	3.86	4.6		77.96
GA-A-062-222-95	Mill Run	4.14	4.6		80.32
GA-A-076-209-96	Blue Lick Run	3.57	3.2		89.89
GA-A-089-1-94	North Glade Run	1.86	2.3		
GA-A-089-2-94	North Glade Run	1.57	3.0		
GA-A-090-310-96	Big Run	4.14	3.0		71.82
GA-A-094-303-97	Bear Cr	3.57	4.6		90.07
GA-A-098-225-95	Ut Bear Creek		4.1		
GA-A-105-317-96	Savage R	3.86	4.1		52.40
GA-A-105-318-96	Savage R	3.57	3.9		43.23
GA-A-107-209-97	Little Bear Cr	4.14	4.1		63.81
GA-A-111-314-97	Little Youghiogheny R		4.1		
GA-A-111-316-95	Little Youghiogheny River	2.71	3.7		38.29
GA-A-112-101-97	Ginseng Run		3.7		4.95
GA-A-120-103-95	Ut Piney Creek	3.86	3.2		96.81
GA-A-121-210-96	Bear Pen Run	4.43	3.0		68.83
GA-A-128-217-95	Ut Cherry Creek	3.00	4.1		6.61
GA-A-130-110-97	Cove Run		3.0		10.00
GA-A-133-112-96	Spring Lick	2.43	3.7		39.26
GA-A-141-213-95	Bear Creek	4.14	4.8		64.75
GA-A-142-118-95	Ut Deep Creek Lake		3.2		9.29
GA-A-143-1-94	Cherry Cr		1.0		

Table 6 (cont.). Fish Index of Biotic Integrity (F-IBI), Benthic Macroinvertebrate Index of Biotic Integrity (B-IBI), Family-Level Benthic Macroinvertebrate Index of Biotic Integrity (Fam. IBI), and Physical Habitat Index (PHI) scores at Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Site	Stream Name	F-IBI	B-IBI	Fam. IBI	PHI
GA-A-143-105-97	Cherry Cr	1.00	1.0		51.38
GA-A-143-5-94	Cherry Cr	1.29	1.0		
GA-A-152-1-94	Marsh Run Cove			2.43	
GA-A-152-5-94	Marsh Run Cove		1.7		
GA-A-159-202-96	Middle Fork	4.14	3.4		42.23
GA-A-179-113-95	Ut Mill Run		4.6		5.45
GA-A-181-1-94	Snowy Cr	2.14	3.2		
GA-A-181-2-94	Snowy Cr	2.71	1.7		
GA-A-181-303-95	Snowy Creek	1.57	2.8		39.75
GA-A-184-328-96	Savage R	3.86	3.9		60.44
GA-A-185-309-95	Cherry Creek	2.71	3.9		68.83
GA-A-185-321-95	Cherry Creek	2.71	3.9		78.31
GA-A-191-322-96	Laurel Run	3.86	2.6		15.91
GA-A-195-203-95	Ut Little Youghioghent R	3.00	2.8		
GA-A-200-224-97	South Br Casselman R	4.43	3.9		42.23
GA-A-205-222-96	Three Forks Run	1.00	1.4		8.30
GA-A-215-1-94	Laurel Run			1.00	
GA-A-215-2-94	Laurel Run			1.57	
GA-A-235-215-95	North Glade Run	1.29	3.2		2.58
GA-A-235-4-94	North Glade Run	1.86	4.1		
GA-A-235-5-94	North Glade Run	2.43		3.29	
GA-A-236-216-95	Big Shade Run	4.14	3.4		30.03
GA-A-236-218-95	Big Shade Run	3.86	3.9		28.75
GA-A-247-111-97	Fikes Run	4.43	3.9		35.90
GA-A-251-217-97	Cherry Cr	1.86	3.0		2.80
GA-A-268-222-97	Un Trib To Bear Cr	4.43	4.3		22.18
GA-A-276-106-96	Double Lick Run	4.71	3.7		34.50
GA-A-279-104-97	Un Trib To Little Youghiogheny R	4.43	4.1		10.00
GA-A-304-316-97	South Br Bear Cr	3.86	4.6		69.70
GA-A-306-210-97	Crab Run	3.29	3.9		10.57
GA-A-309-215-97	Ginseng Run	4.43	3.4		19.48
GA-A-309-221-97	Ginseng Run	4.14	3.4		17.92
GA-A-310-318-97	North Br Casselman R	3.57	3.9		76.89
GA-A-314-116-96	Un Trib To Glade Run		3.9		2.74
GA-A-315-101-96	Blacklick Run	4.43	3.9		55.45
GA-A-326-106-95	Millers Run	3.00	3.2		45.25
GA-A-343-319-97	Buffalo Run	3.86	4.3		70.56
GA-A-347-1-94	Deep Creek Lake		2.1		
GA-A-347-3-94	Deep Creek Lake			1.00	
GA-A-347-4-94	Deep Creek Lake				
GA-A-351-117-95	Piney Creek	4.43	4.3		84.73
GA-A-352-212-97	Broad Ford Run	3.57	3.9		15.10
GA-A-358-115-95	Ut Piney Creek	2.71	4.1		37.33
GA-A-368-116-97	Hoyes Run		2.8		
GA-A-372-129-96	Un Trib To Middlefork Run		3.9		7.27
GA-A-373-220-95	Rocklick Creek	3.29	4.3		18.23
GA-A-395-219-97	Mill Run	3.57	3.9		62.86
GA-A-405-112-95	Ut Ford Run	2.71	4.1		8.46

Table 6 (cont.). Fish Index of Biotic Integrity (F-IBI), Benthic Macroinvertebrate Index of Biotic Integrity (B-IBI), Family-Level Benthic Macroinvertebrate Index of Biotic Integrity (Fam. IBI), and Physical Habitat Index (PHI) scores at Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Site	Stream Name	F-IBI	B-IBI	Fam. IBI	PHI
GA-A-407-310-97	North Br Casselman R	3.86	3.4		54.44
GA-A-407-312-97	North Br Casselman R	2.71	3.2		62.38
GA-A-407-313-97	North Br Casselman R	3.86	3.7		64.75
GA-A-407-314-95	North Branch Casselman R	3.86	3.9		89.51
GA-A-409-102-97	Un Trib To Youghiogheny R	2.43	3.7		34.96
GA-A-416-118-96	Blackhawk Run		4.3		14.84
GA-A-420-323-95	Herrington Run	3.00	1.9		
GA-A-420-325-95	Herrington Run	2.71	1.7		
GA-A-432-315-95	Bear Creek	4.14	4.1		88.92
GA-A-432-320-95	Bear Creek	4.14	2.3		
GA-A-439-205-97	South Br Casselman R	3.57	2.1		62.38
GA-A-443-112-97	Bull Glade Run	1.00	2.1		35.90
GA-A-450-113-97	Un Trib To Casselman R	2.71	3.2		15.91
GA-A-453-310-95	North Branch Casselman R	3.57	4.1		62.86
GA-A-457-114-95	Ut Little Bear Creek	4.71	3.9		25.52
GA-A-470-306-96	Lostland Run	2.43	2.6		61.41
GA-A-470-309-96	Lostland Run	1.86	2.1		25.13
GA-A-470-315-96	Lostland Run	3.00	2.3		79.67
GA-A-490-116-95	White Meadow Run		3.0		
GA-A-490-119-95	White Meadow Run		3.0		
GA-A-493-109-95	Little Laurel Run	4.43	5.0		32.22
GA-A-496-105-96	Glade Run	2.43	2.8		3.76
GA-A-505-210-95	North Branch Casselman R	2.71	3.7		16.75
GA-A-505-218-97	North Br Casselman R	3.29	3.2		43.73
GA-A-506-106-97	Un Trib To Buffalo Run		4.1		7.70
GA-A-511-322-95	North Branch Casselman R	3.29	2.8		75.78
GA-A-512-214-96	Bear Pen Run	4.14	3.9		49.84
GA-A-518-220-97	Un Trib To Youghiogheny R	3.86	3.9		64.28
GA-A-520-1-94	Marsh Run Cove		2.1		
GA-A-520-2-94	Marsh Run Cove		2.3		
GA-A-521-108-95	Mill Run	1.86	4.6		18.84
GA-A-523-203-96	Un Trib To Laurel Run	2.43	4.6		61.41
GA-A-542-304-97	Muddy Cr	3.29	3.0		70.99
GA-A-542-308-97	Muddy Cr	3.57	2.1		63.33
GA-A-542-309-97	Muddy Cr	3.57	3.2		58.46
GA-A-545-301-95	North Branch Casselman R	3.57	3.4		83.36
GA-A-545-302-97	North Br Casselman R	3.57	3.2		52.91
GA-A-547-108-97	Salt Block Run	1.86	4.1		11.57
GA-A-547-2-94	Salt Block Run			2.43	
GA-A-547-5-94	Salt Block Run	3.00	2.3		
GA-A-547-8-94	Salt Block Run				
GA-A-548-1-94	Cherry Cr			1.00	
GA-A-548-2-94	Cherry Cr	1.57	1.7		
GA-A-548-3-94	Cherry Cr				
GA-A-548-317-95	Cherry Creek	1.00	1.7		17.04
GA-A-551-227-95	Ut Bear Creek	1.29	3.4		
GA-A-553-1-94	Cherry Cr		1.0		
GA-A-553-2-94	Cherry Cr		1.2		

Table 6 (cont.). Fish Index of Biotic Integrity (F-IBI), Benthic Macroinvertebrate Index of Biotic Integrity (B-IBI), Family-Level Benthic Macroinvertebrate Index of Biotic Integrity (Fam. IBI), and Physical Habitat Index (PHI) scores at Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Site	Stream Name	F-IBI	B-IBI	Fam. IBI	PHI
GA-A-557-1-94	North Glade Run	1.57	1.7		
GA-A-557-2-94	North Glade Run	1.86	1.9		
GA-A-558-211-96	Savage R	4.14	2.3		94.37
GA-A-560-201-95	Buffalo Run	3.57	4.6		71.41
GA-A-563-318-95	Herrington Run	2.43	3.2		14.33
GA-A-999-1-94	Snowy Cr			3.29	
GA-A-999-2-94	Snowy Cr			2.43	
GA-A-999-302-96	Savage R	4.14	4.3		73.45

Table 7. Water chemistry data collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Site	pH	Conductivity (µS/cm)	Acid Neutralizing Capacity (µeq/L)	Nitrate (mg/L)	Sulfate (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Organic Carbon (mg/L)
L-A-229-109-96	5.21	0.028	-10.50	0.307	7.747	8.10	1.10
AL-A-567-126-96	4.57	0.404	-12.70	0.616	25.537	7.50	1.60
GA-A-001-105-95	6.80	0.040	144.41	0.230	9.263	4.50	2.00
GA-A-002-312-96	7.46	0.146	135.20	0.579	11.810	8.90	2.10
GA-A-008-213-96	6.67	0.056	76.10	1.196	10.852	8.50	1.00
GA-A-010-205-95	6.92	0.056	276.46	0.663	8.684	6.50	5.00
GA-A-011-1-94							
GA-A-011-2-94	4.85	0.084	-8.74	0.090	25.671		3.00
GA-A-011-301-97	5.92	0.111	25.40	0.248	42.145	8.10	2.30
GA-A-011-317-97	5.98	0.114	37.20	0.226	42.562	6.50	2.50
GA-A-017-223-96	6.60	0.124	132.00	0.363	41.196	7.30	1.00
GA-A-021-1-94							
GA-A-021-2-94	4.13	0.051	-85.40	0.050	8.376		3.00
GA-A-022-215-96	7.25	1.229	245.40	0.837	16.297	7.40	1.00
GA-A-027-1-94							
GA-A-027-2-94	4.68	0.106	-26.43	0.120	34.229		3.00
GA-A-028-117-97	6.79	0.058	165.40	1.297	9.500	8.50	1.30
GA-A-030-213-97	7.14	0.123	172.80	1.081	10.029	7.30	2.30
GA-A-039-307-97	7.28	0.104	280.40	1.351	12.485	7.20	1.10
GA-A-050-201-97	7.07	0.088	267.10	1.521	10.236	8.60	1.80
GA-A-053-206-96	7.11	0.048	111.40	0.465	10.753	8.10	0.90
GA-A-059-216-97	7.05	0.114	173.10	0.742	30.207	9.20	1.50
GA-A-059-225-97	7.00	0.106	149.60	0.682	27.910	9.00	1.30
GA-A-062-202-95	7.19	0.178	171.70	0.681	12.072	7.70	1.00
GA-A-062-203-97	7.13	0.208	168.10	0.751	11.163	9.30	0.80
GA-A-062-222-95	7.22	0.167	178.53	0.634	11.797	8.50	1.00
GA-A-076-209-96	6.92	0.050	98.80	0.795	11.535	9.40	0.70
GA-A-089-1-94							
GA-A-089-2-94	6.45	0.080	93.57	0.924	9.637		2.00
GA-A-090-310-96	6.72	0.048	73.60	0.504	11.805	8.50	0.90
GA-A-094-303-97	7.13	0.079	171.60	0.986	10.922	8.30	0.90
GA-A-098-225-95	7.07	0.065	196.42	0.589	12.443		2.00
GA-A-105-317-96	7.00	0.343	158.60	0.739	13.223	7.90	2.90
GA-A-105-318-96	7.19	0.288	160.40	0.773	14.096	7.60	2.60
GA-A-107-209-97	6.93	0.082	85.80	0.810	8.159	9.10	0.60
GA-A-111-314-97	7.29	0.084	216.30	0.544	10.615		1.60
GA-A-111-316-95	7.40	0.093	356.37	0.378	13.141	6.90	2.00
GA-A-112-101-97	6.97	0.358	158.90	0.714	10.837	7.00	0.90
GA-A-120-103-95	7.10	0.319	262.18	0.678	11.158	5.90	1.00
GA-A-121-210-96	6.80	0.053	63.60	0.572	13.683	8.30	1.10
GA-A-128-217-95	7.12	0.051	245.36	0.551	7.924	7.90	2.00
GA-A-130-110-97	6.82	0.567	138.00	4.913	9.576	8.10	0.90
GA-A-133-112-96	6.92	0.064	149.00	0.677	13.862	9.10	1.10
GA-A-141-213-95	7.00	0.046	157.48	0.587	8.529	8.10	2.00
GA-A-142-118-95	6.97	0.067	302.70	0.779	12.231	7.50	4.00
GA-A-143-1-94							
GA-A-143-105-97	5.03	0.081	-6.30	0.196	27.163	5.40	3.00
GA-A-143-5-94	4.75	0.114	-28.23	0.126	37.797		2.00

Table 7 (cont.). Water chemistry data collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Site	pH	Conductivity (µS/cm)	Acid Neutralizing Capacity (µeq/L)	Nitrate (mg/L)	Sulfate (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Organic Carbon (mg/L)
GA-A-152-1-94	5.08	0.028	-7.62	0.179	6.775		1.00
GA-A-152-5-94	4.94	0.028	-10.42	0.280	6.058		1.00
GA-A-159-202-96	6.83	0.059	66.30	0.716	14.048	8.50	1.00
GA-A-179-113-95	7.34	0.092	464.80	0.606	12.000	7.10	2.00
GA-A-181-1-94							
GA-A-181-2-94	6.48	0.061	96.67	0.441	17.468		1.00
GA-A-181-303-95	7.15	0.099	290.09	0.519	27.589	9.10	2.00
GA-A-184-328-96	7.02	0.140	140.60	0.631	12.277	7.70	1.40
GA-A-185-309-95	7.05	0.090	375.20	0.708	8.411	7.50	3.00
GA-A-185-321-95	7.06	0.089	389.08	0.715	8.395	7.30	3.00
GA-A-191-322-96	7.21	0.174	233.40	0.403	58.882	7.80	1.30
GA-A-195-203-95	7.14	0.123	319.99	1.139	12.857	7.20	1.00
GA-A-200-224-97	7.19	0.098	182.70	0.636	21.155	7.60	1.20
GA-A-205-222-96	3.62	0.448	-319.70	0.497	160.576	9.30	0.80
GA-A-215-1-94							
GA-A-215-2-94	4.12	0.121	-134.52	0.219	48.751		1.00
GA-A-235-215-95	6.83	0.083	158.04	0.672	10.482	7.30	2.00
GA-A-235-4-94							
GA-A-235-5-94	6.53	0.071	131.80	0.834	9.058		3.00
GA-A-236-216-95	6.97	0.105	197.17	0.423	34.615	6.90	
GA-A-236-218-95	7.01	0.092	158.71	0.461	26.159	7.10	
GA-A-247-111-97	7.16	0.047	156.30	0.603	8.320	8.60	0.70
GA-A-251-217-97	6.85	0.082	195.60	0.593	15.777	7.00	1.40
GA-A-268-222-97	6.24	0.098	279.20	1.739	16.197	9.00	1.00
GA-A-276-106-96	6.77	0.050	55.20	0.494	12.892	9.00	0.80
GA-A-279-104-97	7.06	0.161	274.20	0.554	11.134	7.20	1.20
GA-A-304-316-97	7.34	0.103	301.80	1.503	13.053	9.50	1.40
GA-A-306-210-97	7.69	0.175	647.10	3.471	16.481	9.10	2.10
GA-A-309-215-97	6.58	0.096	76.20	0.859	9.661	8.00	1.00
GA-A-309-221-97	7.69	0.119	501.50	1.076	11.508	8.00	1.00
GA-A-310-318-97	6.74	0.070	65.00	0.431	16.920	8.60	1.40
GA-A-314-116-96	6.69	0.042	140.20	0.417	7.174	7.20	1.20
GA-A-315-101-96	6.97	0.073	84.40	1.853	14.023	7.90	1.10
GA-A-326-106-95	7.10	0.052	222.28	0.334	8.496	7.00	4.00
GA-A-343-319-97	7.33	0.104	242.50	0.613	18.869	8.30	1.30
GA-A-347-1-94	4.44	0.043	-36.79	0.122	9.679		1.00
GA-A-347-3-94							
GA-A-351-117-95	6.55	0.138	136.70	0.673	11.436	7.80	3.00
GA-A-352-212-97	6.82	0.075	163.60	0.693	8.975	7.60	1.70
GA-A-358-115-95	7.12	0.102	176.95	1.979	10.051	8.20	2.00
GA-A-368-116-97	7.59	0.109	805.40	0.824	9.443		1.00
GA-A-372-129-96	6.82	0.058	89.60	0.735	14.915	7.40	1.60
GA-A-373-220-95	7.54	0.140	279.84	0.452	14.984	7.20	2.00
GA-A-395-219-97	7.13	0.192	171.40	0.688	13.600	8.90	0.90
GA-A-405-112-95	6.85	0.120	334.85	0.749	15.673	8.80	6.00
GA-A-407-310-97	6.73	0.065	73.20	0.464	14.791	8.60	1.70
GA-A-407-312-97	6.70	0.070	68.70	0.474	15.709	7.70	1.70
GA-A-407-313-97	6.57	0.068	69.30	0.477	15.182	7.10	1.70

Table 7 (cont.). Water chemistry data collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

Site	pH	Conductivity (µS/cm)	Acid Neutralizing Capacity (µeq/L)	Nitrate (mg/L)	Sulfate (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Organic Carbon (mg/L)
GA-A-407-314-95	6.97	0.082	114.05	0.331	21.980	7.90	1.00
GA-A-409-102-97	6.45	0.167	44.40	0.390	14.699	8.90	0.80
GA-A-416-118-96	6.79	0.027	61.10	0.828	13.933	8.40	0.60
GA-A-420-323-95	6.07	0.031	47.69	0.188	8.092	5.80	2.00
GA-A-420-325-95	6.05	0.034	17.30	0.187	7.902	6.50	2.00
GA-A-432-315-95	6.96	0.051	160.66	0.647	9.589	7.40	1.00
GA-A-432-320-95	6.99	0.060	161.01	0.741	8.802	7.40	2.00
GA-A-439-205-97	6.26	0.140	181.20	0.685	43.436	8.00	1.40
GA-A-443-112-97	4.77	0.030	-25.20	0.274	8.040	9.00	1.00
GA-A-450-113-97	7.49	0.161	284.00	0.674	17.673	7.80	1.30
GA-A-453-310-95	7.11	0.099	276.76	0.454	25.423	7.20	1.00
GA-A-457-114-95	7.14	0.182	278.36	0.592	13.186	6.80	1.00
GA-A-470-306-96	7.18	0.173	187.90	0.345	62.812	8.40	1.10
GA-A-470-309-96	7.21	0.172	185.10	0.352	61.635	8.20	1.00
GA-A-470-315-96	7.19	0.169	177.80	0.355	61.144	8.20	1.10
GA-A-490-116-95	6.67	0.084	277.93	0.333	13.837		5.00
GA-A-490-119-95	7.23	0.113	537.31	0.376	9.793		4.00
GA-A-493-109-95	6.86	0.050	109.37	0.269	11.140	6.40	2.00
GA-A-496-105-96	7.30	0.236	861.50	0.322	67.058	7.70	1.60
GA-A-505-210-95	6.49	0.092	110.87	0.262	22.783	6.10	3.00
GA-A-505-218-97	6.72	0.078	83.80	0.446	17.766	8.00	2.10
GA-A-506-106-97	7.25	0.055	239.20	0.398	9.194	7.30	1.20
GA-A-511-322-95	6.59	0.071	51.45	0.275	22.844	6.50	2.00
GA-A-512-214-96	6.84	0.053	65.40	0.535	13.445	7.60	0.90
GA-A-518-220-97	7.62	0.156	764.30	2.032	13.042	8.40	1.20
GA-A-520-1-94	4.94	0.027	-12.39	0.142	7.150		1.00
GA-A-520-2-94							
GA-A-521-108-95	6.96	0.240	161.93	0.570	15.887	6.85	1.00
GA-A-523-203-96	7.45	0.203	466.10	0.530	63.177	8.90	1.10
GA-A-542-304-97	6.54	0.035	42.90	0.369	8.238	8.20	1.90
GA-A-542-308-97	6.48	0.035	46.60	0.375	8.179	7.10	2.10
GA-A-542-309-97	6.51	0.036	45.40	0.356	8.163	8.20	2.20
GA-A-545-301-95	6.76	0.094	85.71	0.291	2.503	7.40	1.00
GA-A-545-302-97	6.71	0.075	60.50	0.437	17.094	8.60	1.50
GA-A-547-108-97	6.93	0.050	216.70	0.406	9.163	6.40	1.30
GA-A-547-2-94							
GA-A-547-5-94	6.86	0.037	64.99	0.272	8.242		
GA-A-548-1-94							
GA-A-548-2-94	5.26	0.099	2.61	0.095	32.101		3.00
GA-A-548-317-95	5.79	0.122	43.50	0.141	52.477	5.60	3.00
GA-A-551-227-95	7.51	0.117	546.03	1.967	17.552	8.80	2.00
GA-A-553-1-94	4.22	0.040	-63.27		8.298		3.00
GA-A-553-2-94							
GA-A-557-1-94	6.17	0.046	73.44	1.147	6.798		2.00
GA-A-557-2-94							
GA-A-558-211-96	6.98	0.239	183.20	0.764	15.610	7.20	3.60
GA-A-560-201-95	7.39	0.158	354.28	0.456	22.977	8.20	2.00
GA-A-563-318-95	5.85	0.031	13.07	0.252	9.822	6.40	2.00

Table 7 (cont.). Water chemistry data collected at Maryland Biological Stream Survey sites in Garrett county, 1994-1997.

Site	pH	Conductivity (µS/cm)	Acid Neutralizing Capacity (µeq/L)	Nitrate (mg/L)	Sulfate (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Organic Carbon (mg/L)
GA-A-999-1-94							
GA-A-999-2-94	6.50	0.066	149.04	0.321	20.751		1.00
GA-A-999-302-96	7.07	0.082	88.40	0.801	12.029	7.80	1.50

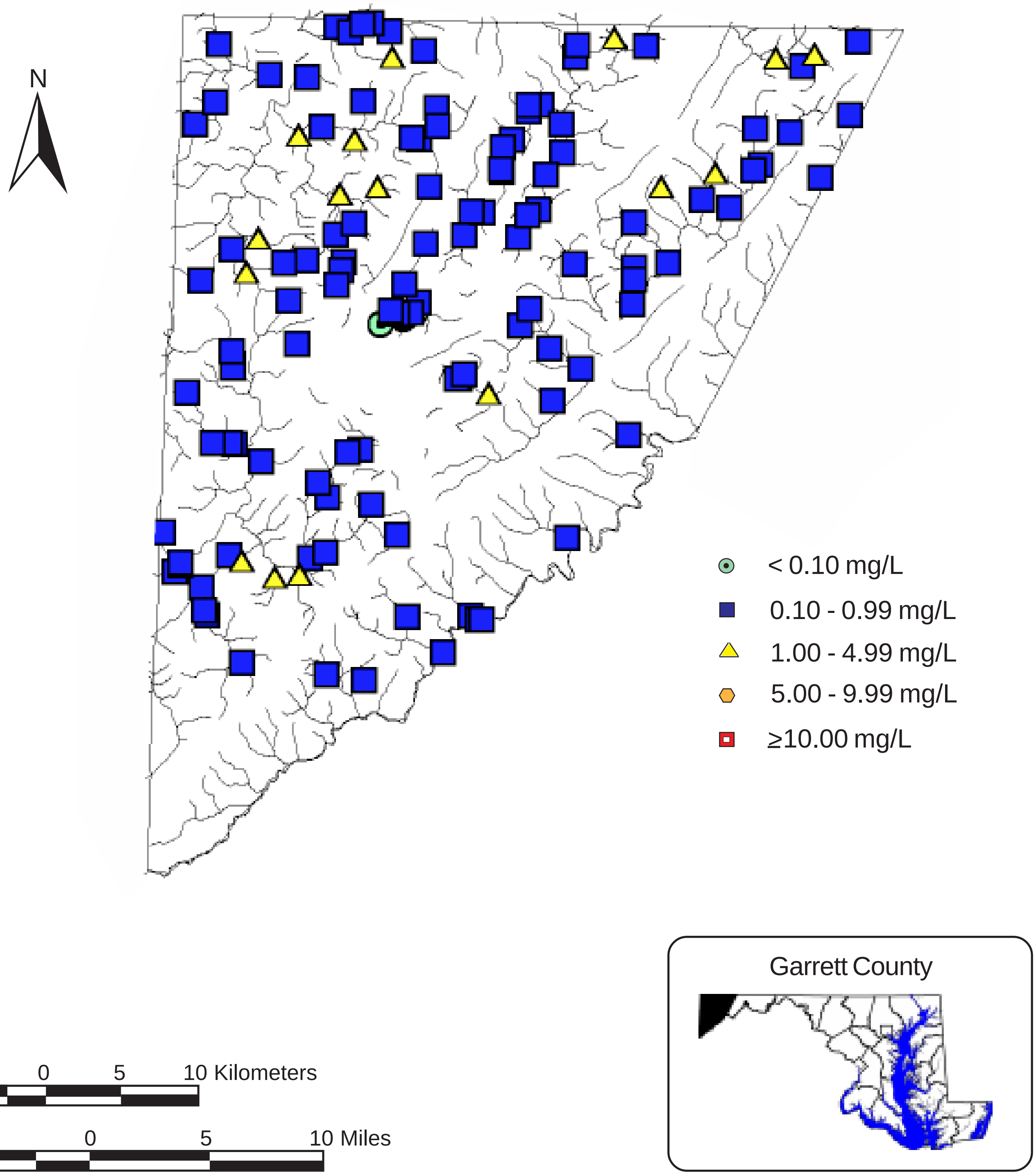

Figure 6. Nitrate-nitrogen concentrations (mg/L) at Maryland Biological Stream Survey sites in Garrett County, 1994-1997.

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Appendix A. Summary of the types of data collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Abbreviations used are as follows: F-IBI - Fish Index of Biotic Integrity; B-IBI Benthic Macroinvertebrate Index of Biotic Integrity; Fam.IBI - Family-Level Benthic Macroinvertebrate Index of Biotic Integrity; PHI - Physical Habitat Index.

Site	Stream Name	Fish	Benthic Macroinvertebrate	Herpetofauna	Habitat	Water Chemistry	F-IBI	B-IBI	Fam. IBI	PHI
AL-A-229-109-96	Staub Run	X	X	X	X	X	X	X		X
AL-A-567-126-96	Un Trib To Sand Spring Run	X	X	X	X	X		X		X
GA-A-001-105-95	Block Run	X	X	X	X	X		X		X
GA-A-002-312-96	Savage R	X	X	X	X	X	X	X		X
GA-A-008-213-96	Blue Lick	X	X	X	X	X	X	X		X
GA-A-010-205-95	Ut Deep Creek Lake	X	X	X	X	X	X	X		X
GA-A-011-1-94	Cherry Cr		X						X	
GA-A-011-2-94	Cherry Cr	X	X	X	X	X	X	X		
GA-A-011-3-94	Cherry Cr	X		X	X					
GA-A-011-301-97	Cherry Cr	X	X	X	X	X	X	X		X
GA-A-011-317-97	Cherry Cr	X	X	X	X	X	X	X		X
GA-A-017-223-96	Laurel Run	X	X	X	X	X	X	X		X
GA-A-021-1-94	Cherry Cr	X	X	X	X			X		
GA-A-021-2-94	Cherry Cr	X	X	X	X	X		X		
GA-A-022-215-96	Mudlick Run	X	X	X	X	X	X	X		X
GA-A-027-1-94	Cherry Cr		X						X	
GA-A-027-2-94	Cherry Cr		X			X			X	
GA-A-027-3-94	Cherry Cr	X		X	X					
GA-A-027-4-94	Cherry Cr	X		X	X					
GA-A-028-117-97	Un Trib To Little Youghiogheny R	X	X	X	X	X		X		X
GA-A-030-213-97	Piney Cr	X	X	X	X	X	X	X		X
GA-A-039-307-97	South Br Bear Cr	X	X	X	X	X	X	X		X
GA-A-050-201-97	Trout Run	X	X	X	X	X	X	X		X
GA-A-053-206-96	Poplar Lick Run	X	X	X	X	X	X	X		X
GA-A-059-216-97	South Br Casselman R	X	X	X	X	X	X	X		X
GA-A-059-225-97	South Br Casselman R	X	X	X	X	X	X	X		X
GA-A-062-202-95	Mill Run	X	X	X	X	X	X	X		X
GA-A-062-203-97	Mill Run	X	X	X	X	X	X	X		X
GA-A-062-222-95	Mill Run	X	X	X	X	X	X	X		X
GA-A-076-209-96	Blue Lick Run	X	X	X	X	X	X	X		X
GA-A-089-1-94	North Glade Run	X	X	X	X		X	X		
GA-A-089-2-94	North Glade Run	X	X	X	X	X	X	X		
GA-A-090-310-96	Big Run	X	X	X	X	X	X	X		X
GA-A-094-303-97	Bear Cr	X	X	X	X	X	X	X		X
GA-A-098-225-95	Ut Bear Creek		X			X		X		

Appendix A (cont.). Summary of the types of data collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Abbreviations used are as follows: F-IBI - Fish Index of Biotic Integrity; B-IBI - Benthic Macroinvertebrate Index of Biotic Integrity; Fam. IBI - Family-Level Benthic Macroinvertebrate Index of Biotic Integrity; PHI - Physical Habitat Index.

Site	Stream Name	Fish	Benthic Macroinvertebrate	Herpetofauna	Habitat	Water Chemistry	F-IBI	B-IBI	Fam. IBI	PHI
GA-A-105-317-96	Savage R	X	X	X	X	X	X	X		X
GA-A-105-318-96	Savage R	X	X	X	X	X	X	X		X
GA-A-107-209-97	Little Bear Cr	X	X	X	X	X	X	X		X
GA-A-111-314-97	Little Youghiogheny R		X			X		X		
GA-A-111-316-95	Little Youghiogheny River	X	X	X	X	X	X	X		X
GA-A-112-101-97	Ginseng Run	X	X	X	X	X		X		X
GA-A-120-103-95	Ut Piney Creek	X	X	X	X	X	X	X		X
GA-A-121-210-96	Bear Pen Run	X	X	X	X	X	X	X		X
GA-A-128-217-95	Ut Cherry Creek	X	X	X	X	X	X	X		X
GA-A-130-110-97	Cove Run	X	X	X	X	X		X		X
GA-A-133-112-96	Spring Lick	X	X	X	X	X	X	X		X
GA-A-141-213-95	Bear Creek	X	X	X	X	X	X	X		X
GA-A-142-118-95	Ut Deep Creek Lake	X	X	X	X	X		X		X
GA-A-143-1-94	Cherry Cr	X	X	X	X			X		
GA-A-143-105-97	Cherry Cr	X	X	X	X	X	X	X		X
GA-A-143-5-94	Cherry Cr	X	X	X	X	X	X	X		
GA-A-152-1-94	Marsh Run Cove	X	X	X	X	X			X	
GA-A-152-5-94	Marsh Run Cove	X	X	X	X	X		X		
GA-A-159-202-96	Middle Fork	X	X	X	X	X	X	X		X
GA-A-179-113-95	Ut Mill Run	X	X	X	X	X		X		X
GA-A-181-1-94	Snowy Cr	X	X	X	X		X	X		
GA-A-181-2-94	Snowy Cr	X	X	X	X	X	X	X		
GA-A-181-303-95	Snowy Creek	X	X	X	X	X	X	X		X
GA-A-184-328-96	Savage R	X	X	X	X	X	X	X		X
GA-A-185-309-95	Cherry Creek	X	X	X	X	X	X	X		X
GA-A-185-321-95	Cherry Creek	X	X	X	X	X	X	X		X
GA-A-191-322-96	Laurel Run	X	X	X	X	X	X	X		X
GA-A-195-203-95	Ut Little Youghioghent R	X	X	X	X	X	X	X		
GA-A-200-224-97	South Br Casselman R	X	X	X	X	X	X	X		X
GA-A-205-222-96	Three Forks Run	X	X	X	X	X	X	X		X
GA-A-215-1-94	Laurel Run		X						X	
GA-A-215-2-94	Laurel Run	X	X	X	X	X			X	
GA-A-235-215-95	North Glade Run	X	X	X	X	X	X	X		X
GA-A-235-4-94	North Glade Run	X	X	X	X		X	X		
GA-A-235-5-94	North Glade Run	X	X	X	X	X	X		X	

Appendix A (cont.). Summary of the types of data collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Abbreviations used are as follows: F-IBI - Fish Index of Biotic Integrity; B-IBI - Benthic Macroinvertebrate Index of Biotic Integrity; Fam. IBI - Family-Level Benthic Macroinvertebrate Index of Biotic Integrity; PHI - Physical Habitat Index.

Site	Stream Name	Fish	Benthic Macroinvertebrate	Herpetofauna	Habitat	Water Chemistry	F-IBI	B-IBI	Fam. IBI	PHI
GA-A-236-216-95	Big Shade Run	X	X	X	X	X	X	X		X
GA-A-236-218-95	Big Shade Run	X	X	X	X	X	X	X		X
GA-A-247-111-97	Fikes Run	X	X	X	X	X	X	X		X
GA-A-251-217-97	Cherry Cr	X	X	X	X	X	X	X		X
GA-A-268-222-97	Un Trib To Bear Cr	X	X	X	X	X	X	X		X
GA-A-276-106-96	Double Lick Run	X	X	X	X	X	X	X		X
GA-A-279-104-97	Un Trib To Little Youghiogheny R	X	X	X	X	X	X	X		X
GA-A-304-316-97	South Br Bear Cr	X	X	X	X	X	X	X		X
GA-A-306-210-97	Crab Run	X	X	X	X	X	X	X		X
GA-A-309-215-97	Ginseng Run	X	X	X	X	X	X	X		X
GA-A-309-221-97	Ginseng Run	X	X	X	X	X	X	X		X
GA-A-310-318-97	North Br Casselman R	X	X	X	X	X	X	X		X
GA-A-314-116-96	Un Trib To Glade Run	X	X	X	X	X		X		X
GA-A-315-101-96	Blacklick Run	X	X	X	X	X	X	X		X
GA-A-326-106-95	Millers Run	X	X	X	X	X	X	X		X
GA-A-343-319-97	Buffalo Run	X	X	X	X	X	X	X		X
GA-A-347-1-94	Deep Creek Lake	X	X	X	X	X		X		
GA-A-347-3-94	Deep Creek Lake		X						X	
GA-A-347-4-94	Deep Creek Lake	X		X	X					
GA-A-351-117-95	Piney Creek	X	X	X	X	X	X	X		X
GA-A-352-212-97	Broad Ford Run	X	X	X	X	X	X	X		X
GA-A-358-115-95	Ut Piney Creek	X	X	X	X	X	X	X		X
GA-A-368-116-97	Hoyes Run		X			X		X		
GA-A-372-129-96	Un Trib To Middlefork Run	X	X	X	X	X		X		X
GA-A-373-220-95	Rocklick Creek	X	X	X	X	X	X	X		X
GA-A-395-219-97	Mill Run	X	X	X	X	X	X	X		X
GA-A-405-112-95	Ut Ford Run	X	X	X	X	X	X	X		X
GA-A-407-310-97	North Br Casselman R	X	X	X	X	X	X	X		X
GA-A-407-312-97	North Br Casselman R	X	X	X	X	X	X	X		X
GA-A-407-313-97	North Br Casselman R	X	X	X	X	X	X	X		X
GA-A-407-314-95	North Branch Casselman R	X	X	X	X	X	X	X		X
GA-A-409-102-97	Un Trib To Youghiogheny R	X	X	X	X	X	X	X		X
GA-A-416-118-96	Blackhawk Run	X	X	X	X	X		X		X
GA-A-420-323-95	Herrington Run	X	X	X	X	X	X	X		
GA-A-420-325-95	Herrington Run	X	X	X	X	X	X	X		

Appendix A (cont.). Summary of the types of data collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Abbreviations used are as follows: F-IBI - Fish Index of Biotic Integrity; B-IBI - Benthic Macroinvertebrate Index of Biotic Integrity; Fam. IBI - Family-Level Benthic Macroinvertebrate Index of Biotic Integrity; PHI - Physical Habitat Index.

Site	Stream Name	Fish	Benthic Macroinvertebrate	Herpetofauna	Habitat	Water Chemistry	F-IBI	B-IBI	Fam. IBI	PHI
GA-A-432-315-95	Bear Creek	X	X	X	X	X	X	X		X
GA-A-432-320-95	Bear Creek	X	X	X	X	X	X	X		
GA-A-439-205-97	South Br Casselman R	X	X	X	X	X	X	X		X
GA-A-443-112-97	Bull Glade Run	X	X	X	X	X	X	X		X
GA-A-450-113-97	Un Trib To Casselman R	X	X	X	X	X	X	X		X
GA-A-453-310-95	North Branch Casselman R	X	X	X	X	X	X	X		X
GA-A-457-114-95	Ut Little Bear Creek	X	X	X	X	X	X	X		X
GA-A-470-306-96	Lostland Run	X	X	X	X	X	X	X		X
GA-A-470-309-96	Lostland Run	X	X	X	X	X	X	X		X
GA-A-470-315-96	Lostland Run	X	X	X	X	X	X	X		X
GA-A-490-116-95	White Meadow Run		X			X		X		
GA-A-490-119-95	White Meadow Run		X			X		X		
GA-A-493-109-95	Little Laurel Run	X	X	X	X	X	X	X		X
GA-A-496-105-96	Glade Run	X	X	X	X	X	X	X		X
GA-A-505-210-95	North Branch Casselman R	X	X	X	X	X	X	X		X
GA-A-505-218-97	North Br Casselman R	X	X	X	X	X	X	X		X
GA-A-506-106-97	Un Trib To Buffalo Run	X	X	X	X	X		X		X
GA-A-511-322-95	North Branch Casselman R	X	X	X	X	X	X	X		X
GA-A-512-214-96	Bear Pen Run	X	X	X	X	X	X	X		X
GA-A-518-220-97	Un Trib To Youghiogheny R	X	X	X	X	X	X	X		X
GA-A-520-1-94	Marsh Run Cove	X	X	X	X	X		X		
GA-A-520-2-94	Marsh Run Cove	X	X	X	X			X		
GA-A-521-108-95	Mill Run	X	X	X	X	X	X	X		X
GA-A-523-203-96	Un Trib To Laurel Run	X	X	X	X	X	X	X		X
GA-A-542-304-97	Muddy Cr	X	X	X	X	X	X	X		X
GA-A-542-308-97	Muddy Cr	X	X	X	X	X	X	X		X
GA-A-542-309-97	Muddy Cr	X	X	X	X	X	X	X		X
GA-A-545-301-95	North Branch Casselman R	X	X	X	X	X	X	X		X
GA-A-545-302-97	North Br Casselman R	X	X	X	X	X	X	X		X
GA-A-547-108-97	Salt Block Run	X	X	X	X	X	X	X		X
GA-A-547-2-94	Salt Block Run		X						X	
GA-A-547-5-94	Salt Block Run	X	X	X	X	X	X	X		
GA-A-547-8-94	Salt Block Run	X		X	X					
GA-A-548-1-94	Cherry Cr		X						X	
GA-A-548-2-94	Cherry Cr	X	X	X	X	X	X	X		

Appendix A (cont.). Summary of the types of data collected at Maryland Biological Stream Survey sites in Garrett County, 1994-1997. Abbreviations used are as follows: F-IBI - Fish Index of Biotic Integrity; B-IBI - Benthic Macroinvertebrate Index of Biotic Integrity; Fam. IBI - Family-Level Benthic Macroinvertebrate Index of Biotic Integrity; PHI - Physical Habitat Index.

Site	Stream Name	Fish	Benthic Macroinvertebrate	Herpetofauna	Habitat	Water Chemistry	F-IBI	B-IBI	Fam. IBI	PHI
GA-A-548-3-94	Cherry Cr	X		X	X					
GA-A-548-317-95	Cherry Creek	X	X	X	X	X	X	X		X
GA-A-551-227-95	Ut Bear Creek	X	X	X	X	X	X	X		
GA-A-553-1-94	Cherry Cr	X	X	X	X	X		X		
GA-A-553-2-94	Cherry Cr	X	X	X	X			X		
GA-A-557-1-94	North Glade Run	X	X	X	X	X	X	X		
GA-A-557-2-94	North Glade Run	X	X	X	X		X	X		
GA-A-558-211-96	Savage R	X	X	X	X	X	X	X		X
GA-A-560-201-95	Buffalo Run	X	X	X	X	X	X	X		X
GA-A-563-318-95	Herrington Run	X	X	X	X	X	X	X		X
GA-A-999-1-94	Snowy Cr	X	X	X	X				X	
GA-A-999-2-94	Snowy Cr	X	X	X	X	X			X	
GA-A-999-302-96	Savage R	X	X	X	X	X	X	X		X

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Appendix B. Physical habitat condition measured by the Maryland Biological Stream Survey, 1994-1997. All variables rated on a scale of 0 (poor) to 20 (optimal) unless otherwise noted.

SUBSTRATE AND INSTREAM COVER

Instream Habitat is rated according to the perceived value of habitat to the fish community. Higher scores are assigned to sites with a variety of habitat types and particle sizes. In addition, higher scores are assigned to sites with a high degree of uneven substrate, including logs and rootwads. In streams where substrate types are favorable but flows are so low that fish are essentially precluded from using the habitat, low scores are assigned. If none of the habitat within a segment is useable by fish, a score of zero is assigned.

Epifaunal Substrate is rated based on the amount and variety of hard, stable substrates usable by benthic macroinvertebrates. Because they inhibit colonization, flocculent materials or fine sediments surrounding otherwise good substrates are assigned low scores. Scores are also reduced when substrates are less stable.

Velocity/Depth Diversity is rated based on the variety of velocity/depth regimes present at a site (slow-shallow, slow-deep, fast-shallow, and fast-deep). As with embeddedness, this metric varies by stream gradient.

Pool/Glide/Eddy Quality is rated based on the variety and spatial complexity of slow or still water habitat within the sample segment. In high-gradient streams, functionally important slow water habitat may exist in the form of larger eddies. Within a category, higher scores are assigned to segments which have undercut banks, woody debris or other types of cover for fish.

Riffle/Run Quality is based on the depth, complexity, and functional importance of riffle/run habitat in the segment, with highest scores assigned to segments dominated by deeper riffle/run areas, stable substrates, and a variety of current velocities.

Embeddedness is a percentage of surface area of larger particles that is surrounded by fine sediments on the stream bottom. In low gradient streams, embeddedness may be high even in relatively unimpaired watersheds.

CHANNEL CHARACTER

Channel Alteration is a measure of large-scale changes in the shape of the stream channel. Channel alteration includes: concrete channels, artificial embankments, obvious straightening of the natural channel, rip-rap, or other structures, as well as recent bar development. Ratings for this metric are based on the presence of artificial structures as well as the existence, extent, and coarseness of point bars, side bars, and mid-channel bars which indicate the degree of flow fluctuations and substrate stability. Evidence of channelization may sometimes be seen in the form of berms that parallel the stream channel.

Bank Stability is rated based on the presence/absence of riparian vegetation and other stabilizing bank materials such as boulders and rootwads, and frequency/size of erosional areas. Sites with steep slopes are not penalized if banks are composed solely of stable materials.

Channel Flow Status is the percentage of the stream channel that has water, with subtractions made for exposed substrates and dewatered areas.

RIPARIAN CORRIDOR

Shading is rated based on estimates of the degree and duration of shading at a site during summer, including any effects of shading caused by land forms.

Appendix B (cont.). Physical habitat condition measured by the Maryland Biological Stream Survey, 1994-1997. All variables rated on a scale of 0 (poor) to 20 (optimal) unless otherwise noted.

Riparian Buffer is rated according to the size and type of the vegetated riparian buffer zone at the site. Cultivated fields for agriculture that have bare soil to any extent are not considered as riparian buffers. At sites where the buffer width is variable, or direct delivery of storm runoff or sediment to the stream is evident or highly likely, the narrowest representative buffer width in the segment (e.g., 0 if parking lot runoff enters directly to the stream) is measured and recorded even though some of the stream segment may have a well developed riparian buffer.

AESTHETICS/REMOTENESS

Aesthetics are rated according to the visual appeal of the site and presence/absence of human refuse, with highest scores assigned to stream segments with no human refuse and visually outstanding character.

Remoteness is rated based on the absence of detectable human activity and difficulty in accessing the segment.